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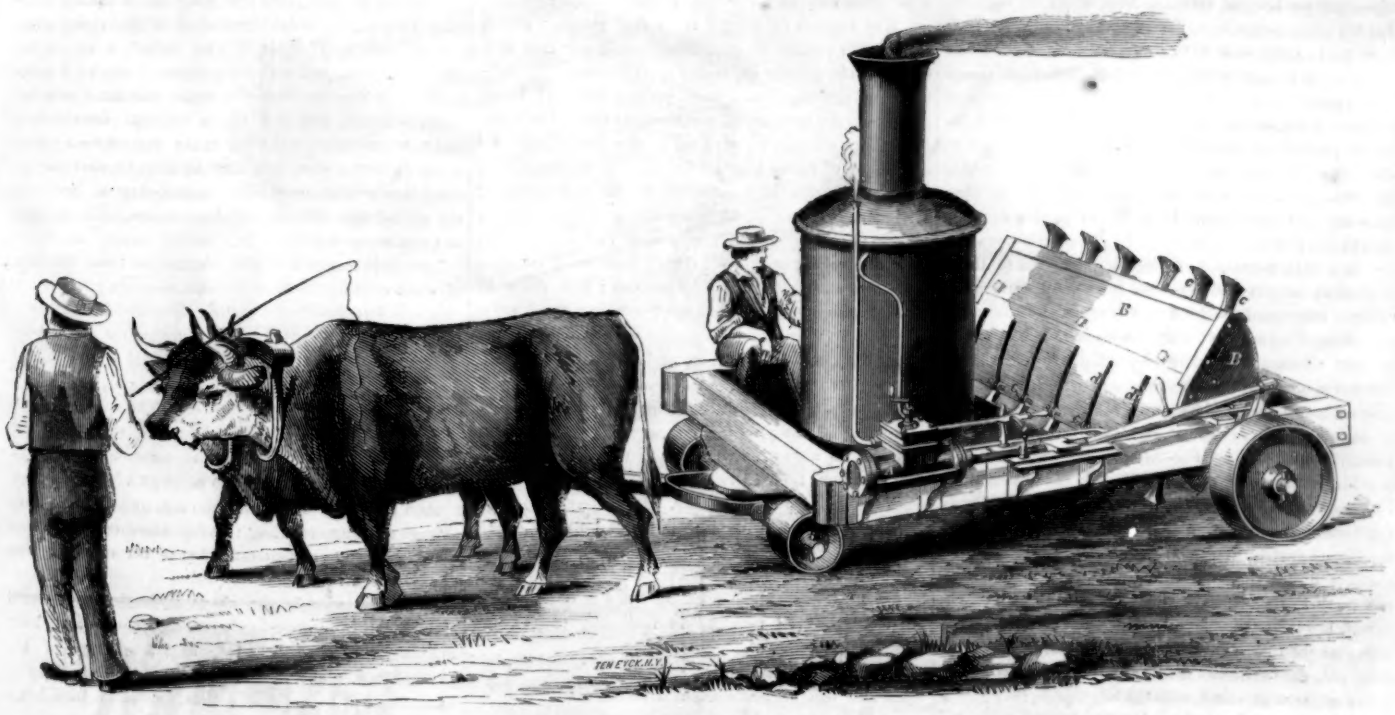
GATLING'S MACHINE FOR PULVERIZING THE SOIL.

Like all perfected inventions the practical steam plow is to be reached by a series of improvements in successive steps, and to this end we call attention to the invention here illustrated. It is esentially a revolving cultivator, which is to be drawn over the ground by animals, reserving its power of a steam engine attached to the machine, to dig up and pulverize the soil by revolving the cultivator head as hereafter described. A stout frame, running upon low wheels, carries the small steam engine, A, upon its forward part, and has the revolving, hollow, lens-shaped box, B, hung in close proximity to its rear axle. The steam engine is connected by a rod with a crank upon the axle of the box, B, so that it may cause the latter to rotate. Upon each edge of the box, B, is a row of cultivator teeth, *c c*, which, as the box rotates, are forced through the soil, pulverizing it in the most effectual manner. The teeth are so arranged in the two edges of the box, that each tooth in one row may pass between the tracks of two teeth in the other row, so as to leave no portion of the soil unwrought. The shanks of the teeth are fastened at their inner ends by pivots, so that they may swing back in the long slots, *d d*, in the sides of the box, and they are held in place and prevented from thus swinging back by the wooden pins, *e e*. The object of this arrangement is to prevent the teeth from being broken in case they should encounter a stump or other rigid object, as the wooden pins would give way and allow the teeth to swing back. The pivots of the teeth-shanks are placed eccentric to the shaft of the box, B, so that as the teeth swing back they may be carried above the obstruction. Whenever a wooden pin is thus broken the damage can be quickly and cheaply repaired. The revolutions of the box, B, it will be seen, aid in propelling the machine along on its course. The teeth are thrown out of work by simply turning the box, B, so that a line joining the two rows of teeth will be in a horizontal position.

The patent for this invention was granted through the Scientific American Patent Agency, on the 29th of May, 1860, and further information in relation to it may be obtained by addressing the inventor, R. J. Gatling, at Indianapolis, Ind.



GATLING'S MACHINE FOR BREAKING AND PULVERIZING THE SOIL.

ENGLISH AND AMERICAN RAILROADS.

We find the following article in the London *Engineer*, which extracts it from the London *Spectator*:—

Even with these qualifications, we English, who take so great a pride in the prosperity of our country, in the returns of capital invested upon our land, and in the certainty of our commercial transactions, may look with some respect upon the actual results of railway enterprise in the United States. Considering the immense spread of the American territory, it is not surprising that the extent of railroads should exceed ours as it does—26,210 miles there against 9,119 here. But the comparison holds good even with regard to population; for every million of people in England, there are 378 miles of railway open; in the United States, 674. The Americans manage to make their railways cheaper for all classes; the average charge for first-class carriages in England is 2d. per mile; in America, 1d. The charge for second-class passengers there is one-third of our average, and for third-class passengers a trifle more than one-third. Yet it is notorious that in convenience and comfort the American carriages greatly exceed the English. The total cost of all the railways in use in England is £304,000,000; in America, £216,000,000. There, 26,000 miles have cost little more than two-thirds of the money paid for 9,000 here. In America, there has been a larger draught upon capital for the purpose of construction and working, and what are the returns? Captain Galton states the nett earnings for English railways at 4.1 per cent, for American railways at 6.7 per cent. If we compare the aggregate of several railways in the two countries, the results are even more striking. We take fifty English railways, including the metropolitan lines, and fifty American railways in what we may call the midland district. Here we find that, as usual, the cost of the English exceeds the American, being £247,000,000 sterling here against £54,500,000 there. The gross revenue in England is £20,000,000, in America nearly £9,250,000. The aggregate nett revenue in England is £10,500,000; in America, nearly £4,500,000. But what is the dividend per cent?—for that is the point which most concerns the shareholder—it is, in England, 4·25 per cent, in America, 8·06 per cent.

SPHEROIDAL CONDITION OF BODIES.—M. Boutigny d'Evroux, whose work on the spheroidal state of bodies has gained him a wide reputation, in a recent communication to the Paris Academy of Sciences, makes objection to the limited manner in which this spheroidal state is recorded in many works on physics. The term should not be exclusively applied to liquids, for solids are likewise susceptible of assuming it. Wax, suet, camphor, bi-chloride of mercury, chloride of ammonium, nitrate of ammonia, stearic acid, margaric acid, and other substances, pass directly to a spheroidal state without at first becoming liquid. If a piece of ice be made to take the spheroidal state, and then be thrown upon the back of the hand—in which experiment the product is partly in the spheroidal state and partly solid—two very distinct sensations will be produced at short intervals: first, that of a temperature nearly that of boiling water; and next, that of cold—nearly two degrees. These changes in temperature are easily determined by a thermometer, if larger quantities be operated upon.

INTERESTING CORRESPONDENCE.

WORKING STEAM EXPANSIVELY.

MESSRS. EDITORS :—Your correspndent, Warren Rowell, on page 183 of the present volume of the SCIENTIFIC AMERICAN, in reference to working steam expansively, says:—"When any one foolish enough to believe in the economy of working steam expansively can point to one single experiment in the history of the steam engine as fairly tried at one of the mills, and can show any saving, he will then have some grounds for his belief, and not otherwise." As your correspondent gives an extract from an English work on the economy of fuel, by T. S. Prideaux, as proof of the foolishness of using steam expansively, I beg to point to the following "experiment in the history of the steam engine," as given in a treatise on the steam engine, edited by John Bourne, C.E., (another English work). On page 12, the author says:—"A forty horse engine, constructed by Mr. Watt,, about the time of the introduction of his expansive principle, was found to require about 8½ lbs. of coal per horse power per hour, when working without expansion, and about 6¼ lbs. when the expansion was 1.518 times. The water evaporated from the boiler was, without expansion, .674 cubic feet per minute, and with the amount of expansion already mentioned, .501 cubic feet per minute." The above experiment (if any reliance is to be placed on it) clearly demonstrates a saving of 2¼ lbs. of coal per horse power, in favor of the expansive working of steam. Now, when we consider that the expansive working of steam, either theoretically or practically, was not an invention in itself, made with a view to the realization of an increased power from a given quantity of steam, but that the increased power was the unexpected result of cutting off steam for the purpose of diminishing the velocity of the piston in a single-acting engine, towards the end of the stroke, and that the above cited experiment appears to have been one of a series made by Watt, to determine or ascertain the precise amount of saving; and the result in figures is there given, I, for one, am inclined to think it quite as much entitled to credit as a simple statement or mere assertion (unbacked by figures or any statement of the actual result) of T. S. Prideaux, so triumphantly brought forward by your correspondent: "that a better effect was obtained by using only two cylinders and cutting off at half stroke, than by using the same quantity of steam in four cylinders, and cutting off at quarter stroke." Practically, it appears the engineers on one of her Majesty's screw steamers have demonstrated that, with a given quantity of steam, the effect is inversely as the number of cylinders, down to two, cutting off at half stroke; but why, in the name of all that is comical, did they stop here? Why not pursue their experiments still further;? for if two cylinders, cutting off at half stroke, are better than four, cutting off at quarter stroke, then one cylinder, following full stroke, must be better still, and, theoretically, at least (if not practically), we arrive at the final and inevitable conclusion that *half a cylinder* and *compressed steam* would beat everything else "all tew thunder." Shade of the immortal Watt! in comparison with the "dazzling orbs" that have risen and now shine in the firmament of engineering science, what a "penny candle" wer't thou; *now* may'st thou "hide thy diminished head;" in short, consider thyself teetotally snuffed and forever extinguished.

Apropos of the above brilliant experiment and its equally brilliant result on an English steamer, I have lately read in the papers (and amongst others, in the SCIENTIFIC AMERICAN, I believe) an account of the engines being taken out of an English mail steamer, running to South America, and its being fitted with new ones constructed, as your correspondent says, "for the express purpose of better obtaining the economy due to a considerable extent of expansion;" and the result was a saving of from one-third to one-half of the fuel formerly used; in fact, the experiment was so eminently successful and satisfactory, that the company had decided to take out the engines in the whole line of steamers and replace them with others constructed like the experimental ones. Comparing this with the experiment cited by your correspondent, how are we to reconcile the two accounts; and if such satisfactory results can be obtained from expansion, on a simple mail steamer, surely as good a result ought to be obtained by engineers having the honor of constructing for her Majesty's screw steamers, to say nothing of the advantages of graduating at the "circumlocution office," and an unlimited amount of "red tape."

For further experiments "in the history of the steam engine" (and "fairly tried" at that), I would refer your correspondent to pages 81–82 of the above-mentioned work, where he will find tables with explanations, showing the relative efficacy of different engines—both non-expansive and with different degrees of expansion—and where he will see that "the order in which the different engines stand, in respect of superiority of duty, is the same as in respect of the amount of expansion." Your correspondent further says:—"The proprietor of an extensive manufactory has told me, this very day, the result of the trial of a cut-off which he had on his engine; he said it made no difference in the cost of the coal used whether he cut off at one-seventh of the stroke or one-half stroke." In reference to this broad assertion, I would say that there is a large engine now running within one hundred feet of the place where I now write, and working on the expansive principle, pure and simple—that is, by an automatic cut-off and no throttle valve. This engine will do its work and hold its proper speed with steam at 40 lbs. pressure and cutting off at half stroke, but to supply it with steam at that point requires a lavish expenditure of fuel and considerable exertion on the part of the fireman; but by simply raising the steam to 60 or 65 lbs., the engine then cuts off at about quarter stroke, or less, and the same work is done with about one-third less fuel. However non-expansionists may account for this, I think that people "foolish enough" to believe in expansion, would say that it is owing to the greater expansion of the steam.

Again, the engine in a large planing mill and building let out for mechanical purposes, up town, has lately been taken out and replaced with a new one. Cause, insufficiency of power and the difficulty of maintaining a pressure of steam high enough to do the work required. Cylinder of old engine, 15 inches diameter, 4 feet stroke; valves, the ordinary slide; no cut-off, and regulated by a throttle valve; pressure of steam, from 90 to 110 lbs.; 3 boilers, about 30 inches by 30 feet; fuel made by planing machines and other wood-working machinery. The new arrangement is an engine with cylinder of 24 inches diameter, 4 feet stroke, and running at the average speed of the old one. An automatic cut-off and regulator, capable of admitting steam up to half stroke, or cutting off close to the commencement, as may be required, no alteration whatever to the boilers. Pressure of steam, from 45 to 55 lbs., cutting off from one-sixth to one-third of the stroke. Result, an abundance of power, coupled with a perfect regularity of speed, and a saving of at least one-third of the fuel. Non-expansionists and *sensible* people predicted a failure; but, by some "hocus-pocus" or other, it did'nt fail; neither did the "received notions," in this case, receive any damage.

When engines are made, that are perfectly steam-tight and can be run without friction, and waste no steam in ports and passages, *then* experiments similar to those described by your correspondent may be considered, to a certain extent, as "fairly tried," and, with all deference to the opinion of your correspondent, that engines with the ordinary slide valve and cut-off valve on the back, are constructed "in the most perfect form for using steam expansively," I would say, that some people are rather skeptical on that point; for such engines, in addition to the above valves, are furnished with a regulating valve in the steam pipe, and, what with being strangled at the throttle valve, and strangled at the cut-off valve, and still further strangled in its efforts to get through the port into the cylinder, the steam (if I may be permitted an expression more foreible than scientific) is "just about strangled to death;" and if the users of such engines would take away the cut-off valve from the slide valve, and diminish the strangling somewhat (for such engines, at best, are but mongrel combinations), in nine cases out of ten the result would be more likely to be beneficial than otherwise.

The experimenters at the Metropolitan Mills will have to make some new arrangements and try again, before they arrive at the relative merits of expansive and non-expansive engines. An engine working with a pressure of 90 lbs. of steam in the boiler, and having its action controlled so that it imparts a uniform pressure of from 20 to 40 lbs. per inch on the piston, *might* by a considerable stretch of the imagination, be considered a non-expansive engine, but I would respectfully say to your correspondent that such is not one of the "received notions;" and further, I would say that it is quite possible the "error" found, at such great cost, by the proprietors of the Metropolitan Mills may be simply this, that while they were under the impression that their engines were constructed "in the most perfect form for using steam expansively," their experiments simply demonstrated that they are eminently adapted for *strangling steam.*

JOHN BROUGHTON.

New York, Sept. 25, 1860.

MESSRS. EDITORS:—Your correspondents who assert, and claim to have proved, that no saving is effected by working steam expansively, cannot reasonably expect to have much attention paid to them. Any one who should declare: "two and two do *not* make four; it is no such thing; I deny it," would probably be allowed to all the disputing in that *controversy* himself.

CHAS. T. PORTER.

235 West 13th street, New York, Sept. 26, 1860.

THE NATURE, ORIGIN AND COMPOSITION OF THE METALS.

MESSRS. EDITORS:—After some considerble investigation, I have arrived at the conclusion, deduced from the following facts, that all the common metals are compounds of iron, nickel and copper, having radical properties of which all the others are composed, in different proportions; that when these metals combine, they do not always loose their original properties, but are still real atoms of iron, nickel or copper, attracted or combined with other atoms; that such combination of separate atoms forms an individual atom of the new metal, and that all the original atoms have a common diameter, and that in the case where a metal is drawn into a wire, one class of atoms (say those of iron) form continuous wires or chains of atoms, and that the second class of atoms adhere to them, but have little or no cohesion together.

The following is a tabular statement of the tenacity of wires of 0.07875 inch diameter:—

	Tenacity.	Cal.	Thomson.	Vol. of atom.
Iron	551.37		551.37	43.5
Platinum	.50	275.68	275.63	56, wire 64
Silver	.33	183.79	187.46	128=43×3
Zinc	.20	110.26	110.25	56
Copper	302.00		302.00	44.4
Gold	.50	151.00	149.97	63.5=43×1½
Nickel	105.86		105.86	42.7
Tin	.33	35.28	35.28	99.3=56+43
Lead	.25	26.46	26.46	113.4=56×2

As I was unable to obtain the density of all the metals in the state of wire, these volumes are calculated by dividing the common density of the metals by the atomic weight.

It will be seen by the above table that the second class of metals, or those having a compound volume, have a tenacity of 1-2, 1-3, 1-4, or 1-5 of that of the radicals iron, nickel and copper, in quantities too exact to attribute it to accident; thus, platinum wire has a tenacity just ½ that of iron; it has also a compound volume, or a volume greater than that of iron, nickel or copper, whose volumes are nearly the same; and the difference which occurs arises no doubt from the different densities the metals assume under various treatments, as will be seen from the following table:—

Names of bodies.	Density.
Platinum, coined	22.100
" wire	19.267
Copper, hammered	8.878
" fused	7.788
Iron, wrought	7.788

It will be observed by reference to table No. I, that the sum of the volume of all the atoms is made up of iron and of platinum; thus, silver is equal to 3 of iron; zinc, equal to platinum; gold, 1½ that of iron; tin, 1 of iron and 1 of platinum; and lead, 2 of platinum; but it appears, by reference to table No. II, that this is not the correct volume for platinum, it being calculated from the ordinary density of the metal=22, when the density of the wire is only 19.267, which makes the volume of its atom just 1½ that of iron; but the tenacity of platinum is just ½ that of iron; the inference, therefore, is that platinum is composed of 1 atom of iron, which has the whole of the tenacity, and that to this atom of iron is attached a short atom of some other metal, which fills up the space but has no tenacity. This is further proved by the other metals; gold has 1 volume and ½ volume,

and its tenacity is ½ of that of copper; tin, 2 volumes and ½ volume, and its tenacity is ½ that of nickel; lead has 2 volumes and 2 ½ volumes, and its tenacity is ¼ that of nickel; while silver has 3 whole volumes, and its tenacity is ½ that of iron. To zinc this does not apply; it has probably 5 very short atoms. From these facts and calculations I conclude that platieum, silver and zinc have each at least one atom of iron, which atom has the whole of the tenacity of the new metal; gold, at least one of copper; and lead and tin, one of nickel. I have assumed that iron, nickel and copper are the primitive and not the compound metals, from the fact which appears by reference to table No. II, that there is no relation to the tenacity of tin and lead, except through nickel, and the same is true of zinc, silver and platinum. I would invite the attention of those who cannot believe these deductions, to consider the curious fact that tin has a volume not equal to 1, 2, or 3 of any other metal, but is equal to the sum of 2. The density and weight of the atoms will be the subject of a future article.

The following table shows the force required to twist one inch round bars of different metals:—

English wrought, 12,063=603×20 or 482−4×25.

Blistered steel, 20,025=603×30+482.4×4.

Shear steel, 20,598=blistered steel+603.

Cast steel, 21,111=shear steel+482.4.

Cast copper, 4,825=4-10ths iron or lead×4 or 603×8 or 482.4×10.

Tin, 1,688=1-10th iron, 1-10th copper or lead+482.4 or 603+2+482.4.

—Lead, 1,206=1-10th iron or 1-4th copper or 603+2.

The numbers 603 and 482.4 are to each other as 5 and 4.

It will be seen, by reference to the last table, that all the metals have a common origin, from the fact that they have all two common units of strength, whose relative values are to each other as 4 and 5; how these quantities arise I have at present no knowledge, but their relation to each other is a fit subject for calculation. It will be seen that they are not only composed of the two whole quantities of strength, but that the natural metals have a rational relation to one another; thus, copper has a strength equal to 4-10 that of iron, and either of them can be divided by either of the units without a remainder, and that none of the others can; from which I infer that had the table contained nickel it would also have been divisible.

From the foregoing, I have arrived at the conclusion that all the metals have a common origin, forming my opinion from the relation of their tenacity, and the fact that their whole strength is made up of the two units of strength, as shown in the last table.

William Coutie.

Troy, N. Y., Aug. 31, 1860.

TWO POINTS OF PATENT LAW.

Messrs. Editors:—Suppose A patents a combination, but afterwards finds his machine will perform to better advantage with a part of the combination omitted. But instead of applying for a re-issue, he sends out B with a power of attorney to sell territory for him, with a model of the altered improvement to be sold under the original letters patent. C not being well posted in nice points in patent law is induced to purchase, and does not discover any flaw until afterwards. Has C any remedy at law?

2. Suppose, also, that attached to the deed given by B to C, there is a printed copy of the original Letters Patent, with claim and specification, all correctly copied, except a single word in the specification, which has evidently been altered to make it correspond with the alteration in the machine. Does this not amount to a fraud, amenable to the laws?

H. C. F.

McGaheysville, Va., Sept. 5. 1860.

[In answer to the above questions, we need only say, that frauds of the kind above stated subject the guilty party to the same penalties when connected with the sale of a patent as when perpetrated in other transactions. The only questions to be considered, when the case is brought before the proper court, will be, whether a fraud has been committed by the defendant, and whether such fraud has caused an injury to the party complaining. If both these are found in the affirmative, suitable damages will be awarded to the plaintiff.—Eds.

HOWE'S PATENT EXTENSION.

Messrs. Editors:—I noticed on page 201 of the present volume of the Scientific American, an editorial article on the subject of the extension of Howe's patent. It seems to me that the views expressed in that article are taken from the argument of Mr. Gifford, the learned counsel in the case, rather than from the entire case as presented. The most important points were two in number, presented to the Commissioner of Patents for his decision, after it was determined that the invention claimed by Howe was legitimate. First, how much of the value of the present modern sewing machine was due to the invention of Howe; and, secondly, what is meant by the language of the statute, which says that, "if, upon the hearing of the matter, it shall appear to the full and entire satisfaction of said board [now the Commissioner of Patents] having due regard to the public interest therein, that it is just and proper that the term of the patent should be extended, by reason of the patentee, without neglect or fault on his part, having failed to obtain, from the use and sale of his invention, a reasonable remuneration for the time, ingenuity and expense bestowed upon the same, and the introduction of them into use, it shall be the duty of the Commissioner of Patents to extend the patent." Does this mean that a patent shall be extended without regard to the amount the inventor may have realized for his invention, provided said amount is proved to be much less than the value of the invention to the public? Or does it mean that if the inventor has either met with loss in giving the public a useful invention, or has been inadequately rewarded for fourteen years of constant and diligent labor, together with his expenditures, such sacrifice shall be made up to him by prolonging his term of patent? It was contended, in opposition to the grant, that the latter was the proper construction, and that the legislators did not intend to have the present value of the invention to the public, or its saving to them, brought into the question. And it was urged that as Mr. Howe had received half-a-million of dollars for his fourteen years' labor, expense, and ingenuity, he has received more than ordinarily falls to the lot of any man, however talented. This is a very important question in the abstract, and the decision of the Commissioner opens a new era in such cases. Judge Mason refused to extend Burden's patent, on the ground that he had been sufficiently remunerated for his time, labor, and ingenuity, yet, with vastly greater labor and expenditure than Mr. Howe, he had not received a fifth of the money. It would be well to know what is to be the rule of action, the present decision determining that no limit of receipts shall be a bar to the extension of a patent. If that is correct, would it not be better that every patent should be extended, of course, by the payment of a certain sum of money. There being no inquiry at the Patent Office, except into the original novelty. Was the law so changed, it would relieve the Commissioner of Patents from the heavy responsibility that now rests upon him, and the odium which you declare has been cast upon the present able officer at the head of the bureau, and which I regret to hear he has been subjected to, as I am confident it is wholly undeserved.

I should not trouble you with this notice on account of any strictures you have thought proper to indulge in, in relation to the opposition to this patent extension, and I have no desire to defend it—that must stand or fall on its own merits; but the great public question is important. The whole community is interested, as well as one of the counsel in opposition who had both client and friends to defend, although the opposition was entered in his name.

Messrs. Editors:—I am an inventor, and have taken out several patents, some of which are useful and important to the public. My inventions—no matter what I may get out of them—are of vastly more importance to the public than they ever can be either to me or to my assignees. I worked hard to produce these inventions, and the credit is due to me for them—not to some unknown one who might have made them at a later period if I had not. These inventions being the product of my brains, why, I would like to ask, are they not my property as much as a wheelbarrow made by my own hands? The law sets a limit on my otherwise natural right to these inventions, solely from considerations of policy, and not from mere absolute right. The law says I may hold an absolute authority over them for a term of fourteen years, and, under certain circumstances, seven years more, after which the public may freely use them forever. Against this I have no appeal, and must, at the appointed time, surrender all my rights to those who had nothing to do with the toils and troubles attending the production of my improvements.

The author of a book, I am told, has a copyright for 28 years; and why should not the inventor be permitted to have the use of his invention for at least 21 years?

These suggestions occurred to me from reading your editorial remarks upon Howe's extension case. I have for so long a time listened to the views of those who were opposed to the extension, that my mind had become prejudiced against the case, and I thought it would be wrong to extend it further. I however fully agree with your views—they are, in my opinion, right—and every inventor in the country owes you a debt of gratitude for your defense of their rights. I know what it is to contend against the prejudice of men, and to be snubbed as a half-crazy inventor. Many years ago, I got up a valuable invention, and after much patient labor made a nice working model of it. I took it to a large manufacturer in Boston and showed it to him, and asked his aid in trying to get out my patent. His reply was, "if you are a fool, you make a mistake in trying to spot me as one. I advise you to go to hoeing corn; you will do somebody good; your invention ain't worth a cent." I was discouraged and did not get a patent for it. If I had done so, it would have been worth more than $100,000 to me. C.

New York Sept. 23, 1860.

Messrs. Editor.—I see by the Scientific American, page 201, present volume, that the Commissioner of Patents has decided that $468,000 is not *enough* for a patent, and you defend him in this decision. Will you please inform your readers what is enough?

When Mr. Howe was struggling to get food for his family to live on, if he had been asked the question whether $400,000 for his patent would satisfy him, can there be any doubt that he would have said yes?

That Mr. Howe himself should have greedily asked for more is not strange, but by what process of reasoning the Commissioner came to the conclusion that he ought to have it at the expense of the poor sewing-girls is, most decidedly, a mystery.

Moderation.

New York, Sept. 26, 1860.

CASSELL'S ILLUSTRATED BIBLE.

We have received from the publishers—Messrs. Cassell, Petter & Galpin, London and New York—the first volume of Cassell's "Illustrated Family Bible." This work is far more profusely illustrated than any edition of the Holy Scriptures that has ever been published.

Nearly half the pages are adorned with large woodcuts, most of them half a page in size, though quite a number cover the entire page. The illustrations consist principally of groups of figures, though maps and bird's-eye views of Egypt, Canaan, &c., are given. The text is accompanied with copious explanatory notes, full of information in regard to the manners and customs of the East, and other matters which elucidate the narrative. The drawings are very natural and spirited, the engravings, the type and the printing are excellent specimens of the art. It is published in parts of 32 pages each, which are issued on the 1st and 15th of each month, at 15 cents a piece. The first volume contains 457 pages, and embraces the books from Genesis to the first book of Samuel, inclusive.

This great work, it seems to us, opens a fine field for active agents to operate in. It ought to be found on the table of every family in the land.

Prosperity of the Patent Office.—As an evidence of the activity among inventors and the prosperous condition of the Patent Office, we would state that we have paid into the treasury, to the credit of the patent fund, during the six days previous to going to press (Saturday, September, 30th), *twenty-six hundred and forty-three dollars*,

A NEW LIGHTNING ROD

A correspondent in Albion, N. Y., communicates a somewhat novel plan for a lightning conductor. He says: "We are in this part of the country using quite extensively, thin strips of sheet copper, nailed to the building, as lightning rods. The plan is to use a thin copper tube, about ¾ of an inch in diameter, along and above the chimney, which at the ridge of the roof is flattened, and riveted to two thin strips of copper about an inch wide each, and these are occasionally nailed along the roof and down the side of the building, and let into the earth a few feet." This conductor if properly put up would surely be efficient. But our correspondent omits to give particulars of perhaps the most important thing to be considered in the erection of a lightning rod, namely, the connection with the ground. He says, "the strips are let into the earth a few feet." Electricity is very particular about the road it travels; it does not hesitate an instant to turn aside if an obstruction is offered to its course; if the way is not perfectly clear to get into the earth, it may prefer to dart into the house and set it on fire. Dry earth is almost a non-conductor, and a rod might as well lie along the ground a few feet, and take the chances as to be buried in dry earth. It is almost a common occurrence for the ground to be plowed up and even wetted in spots around a lightning rod, a fact which shows that those who put up rods, are either ignorant or neglectful of their duty. In a city, lightning rods should invariably be put in metallic communication with the gas or water mains, and in the country with a stream or well of water. If this rule were followed we should not hear of half the number of cases in which buildings having rods are injured by lightning.

Whether a lightning rod be of iron or copper, or square round or flat, or whether the conducting power resides on the surface or through the mass are questions of very little practical consequence beyond the effect they may have on the cost of construction. We have never seen a rod or heard of one being used, which was too small or too poor a conductor to carry of all the electricity which its point would receive. Lightning leaves a rod to go into a house only when its continuity is imperfect, or as is more likely to happen, when it cannot discharge itself into the earth.

NEW PLANET DISCOVERED.

OBSERVATORY, Washington, Sept. 17, 1860.

SIR: A planet was discovered here last Saturday night, by Mr. Ferguson, at 9h. 19m. 38. 6s. in 23h. 4m. 38. 5s. of A. R., and 3° 22m. 53. 8s. South declination. It was first seen by him the night previous, but the observations were not conclusive as to its true character. This is the fifty-ninth in the family of asteroids, and the third discovered by this indefatigable assistant.

It remains to be seen whether we have been anticipated in this discovery. If we have not, and unless you direct otherwise, I propose to name this new star from the Indian mythology of this continent.

Respectfully,

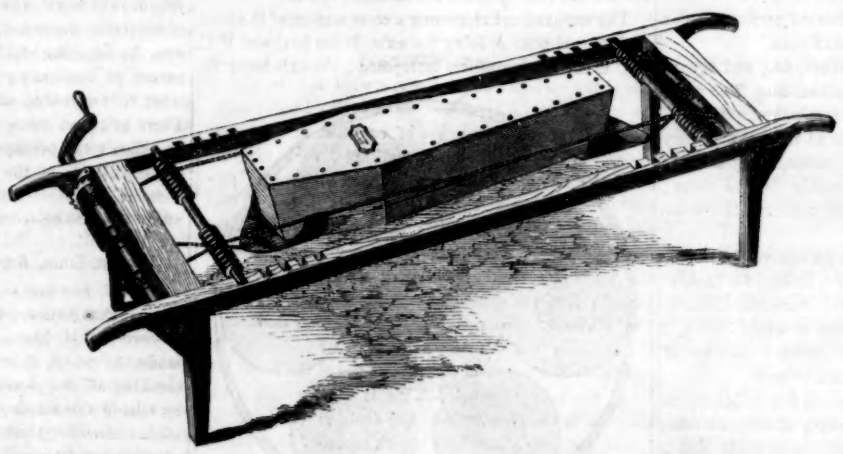
M. F. MAURY, Superintendent.

HON. ISAAC TOUCEY, Secretary of the Navy.

PATENT BIER AND MODE OF LOWERING COFFINS.

The life of this age, most assuredly, moves on patent inventions. The infant is wrapped in linen which has been woven upon a patent loom, from yarn spun upon a patent frame, and he draws his first drop of nourishment from his mother's breast through a patent nipple shield. The girl fondles a patent doll, the boy whirls a patent top or plays with a ball which is made under one of the most valuable patents of the age. In later life we put on a patent French yoke shirt, which, with the rest of our clothes, is sewed on a patent machine, with a patent thread, by a patent needle, which comes enveloped in a patent wrapper, and our very boots are made of patent leather. We rise in the morning from a patent eliptic spring bed, undo the patent fastenings of our windows, roll up our patent curtains, open the patent lock of our doors, which was constructed by patented machinery, and go down to our coffee, which is made in a patent "Old Dominion" pot. We write with one of Morton's pens, which we dip into patent ink in a patent stand. Thus, surrounded by patents, we pass our life, which is filled with gorgeous dreams of making a splendid fortune by some patent invention of our own, till at last we are placed in a patent burial case, and lowered from a patent bier into our final place of rest.

For this ultimate disposition of us all the patent bier here illustrated has been invented, and we have never described an invention which was more certain to be needed by every member of the community. The method of its use will be readily understood by examining the engraving. The cords, being adjusted to the width, and the supports which slide on them to the length of the coffin, are wound up tight, and the pawl put down on the ratchet wheel to keep them secure. The coffin is taken from the hearse and placed on the



SCARLETT'S BIER AND MODE OF LOWERING COFFINS.

bier, each end resting on one of the support. The bier being carried to the grave and placed directly over it, the undertaker throws back the pawl, and, unwinding the cords, the coffin reaches the bottom. By unwinding a little more, the supports are drawn from under the ends of the coffin; the middle cord, being three or four inches shorter than the other, begins to wind up as soon as the coffin reaches the bottom, while the outside rope is still unwinding. The whole being then wound up, the bier is ready for another interment.

The patent for this invention was granted to the inventor, William Scarlett, and further information in relation to it may be obtained by addressing him at Aurora, Ill.

THE EMPTY BIER.

BY HANNAH GOULD.

"Thou empty bier that standest here,
Alone by the churchyard gate,
Say, whose the door thou'lt pause before
Thy burden next to wait?"

The bier replied, "My range is wide,
And my hours of rest but few;
But to One alone can the ways be known,
That I must hence pursue.

"I first may seek her form, whose cheek
Is fresh in its maiden bloom,
On me to lie with a rayless eye,
At the threshold of the tomb.

"The youth who last sped by so fast,
With the nerve and the glow of health,
He next may find, that close behind,
Death followed him by stealth.

"Or she, who smiled when the lovely child,
She was lately leading near,
With wonder stopped, and his lilies dropped,
To gaze at the sable bier;

"That mother may be called to lay
That beauteous boy on me,
In his morning hour, like the dewy flower,
He lost, and as suddenly.

"Her own pale clay, to bear away,
It next may be my lot,
She may close her eyes on her infant ties,
And her prattler be forgot.

"And as I call in time for all,
From the babe to the silver haired,
Thy glance at me, perchance may be,
A hint to be prepared."

HOW TO MAKE CLOTH AND PAPER INCOMBUSTIBLE.

Cloth and paper cannot be made to burn unless oxygen is present, and in the presence of oxygen there will be no burning unless there be a considerable heat to begin it; the combined presence of the three things, combustible, oxygen, and heat is essential. A plan, therefore, of rendering a combustible, fireproof, must provide for the removal from it, of either oxygen or heat, or both; the cloth or paper must be enveloped in a varnish which is of itself incombustible, and at the same time impermeable to oxygen and heat. If we had such a varnish, and it did not injure the pliability and other good qualities of the cloth and paper, the problem would be completely solved, and if the art could be practiced cheap enough, the occupation of the washerwoman would be gone, for we should send our dirty linen to the blacksmith, who would throw it on his fire, and when it became brilliantly white (hot), would take it off and hang it up to cool.

But we have no such varnish and the materials for its composition are quite beyond the present possibilities of chemistry. Our attempts at fire-proofing will be only distant approaches to the perfect plan.

There is no organic substance that does not burn, or is not destroyed by heat. Water, from the fact that it is a product of combustion will not burn, but it has not the other properties desirable; it does not dry up and leave and elastic covering. Thus far then, only mineral substances have been used for fire-proofing; and among these alum has been the greatest favorite. A piece of cloth or paper dipped in a solution of alum, and then dried, is tolerably safe from fire, the whole surface being covered with matter which will not burn. Alum also, has the property of taking up a large quantity of water still appearing dry, and it cannot be heated much above 212° before all the water has evaporated.

Soluble glass (silicate of soda) has often been proposed as a fire protector and especially for wood. Being glass when the water has evaporated, one would suppose it would be altogether too brittle for fabrics which must be flexible. Mr. F. A. Able, of Woolwich, England, however, has made a little advance on the old plans by proposing to impregnate tissues with a metallic silicate. The particulars of his process are as follows:

"I take," he says, "a solution of lead, of zinc, or, practically speaking, of any other metallic base capable of forming, by its action upon a soluble silicate, a double silicate, insoluble in water. For this purpose I prefer the use of a basic acetate of lead, prepared as is well-known, by boiling sugar of lead and litharge with water and although I have found that solutions of various strengths will answer the purpose, yet that which I prefer is prepared by boiling together, according to the following proportions—25 pounds of sugar of lead, 15 pounds of litharge, and 40 gallons of water, for about half an hour, allowing it to stand for about a couple of hours; the decanted clear solution forms a liquor well adapted to my said purpose. When I want to use the liquor so prepared, and which, in the present instance, is a solution of basic acetate of lead, I take such a quantity of it, as will be at least sufficient to cover completely the fabric or material which I intend to render uninflammable, or else the said fabric or material may in many cases be simply passed through the said liquid, raised to nearly the boiling point, the object being simply to saturate or impregnate it thoroughly with the said liquor. This having been done, the fabric or material so saturated or impregnated with the said liquor is to be removed and spread out for about 12 hours to the contact of the air. This hanging or spreading out of the fabric or material to the air, may be dispensed with, but I prefer to do so, the subsequent operation, now to be described yielding then, a better result. The material of

fabric, after having been subjected to the first operation, just described, should now be immersed for a period of from one to two hours, or thereabouts, in a hot and moderately strong solution of an alkaline silicate, by preference in silicate of soda. The material or fabric should then be withdrawn from the said bath of alkaline silicate, allowed to drain, washed thoroughly in soft water, and dried, when it will be found to have acquired the properties claimed for it."

AMERICAN NAVAL ARCHITECTURE.

THE STEAMER "NEW BRUNSWICK."

This steamer was constructed by John Englis, foot of Tenth street, East river, New York city. She was built under the direction of Mr. John B. Coyle, of Portland, for the International Steamship Company, and is to ply from St. Johns, New Brunswick, to Portland, Maine, stopping at Calais and other intermediate places, and connecting with the Grand Trunk Railway.

She is very substantially built, adapted to the roughest sea weather, and admirably calculated for the rough and rocky coast along which she is intended to run.

The minute details of her construction are as follows: Length on deck, from fore-part of stem to after-part of stern-post, above the spar-deck, 224 feet; breadth of beam at midship section, above the main wales (molded), 30 feet 8 inches; depth of hold, 12 feet; depth of hold to spar-deck, 12 feet 3 inches; draft of water at load-line, 6 feet 6 inches; area of immersed section, at this draft, 180 square feet; tunnage, 815 tuns.

Her hull is of white oak, chestnut, &c., and square fastened with copper, treenails, spikes, &c. The floors are molded 14 inches, and sided 6 inches. The distance of frames apart at centers is 24 inches, and they are not filled in solid; but iron straps, diagonal and double laid, 4 by ½ inches securely fastens them; wrought iron straps, 6 by ¾ inches, connect all the top timbers.

The *New Brunswick* is fitted with one vertical beam condensing engine; diameter of cylinder, 48 inches; length of stroke of piston, 11 feet; diameter of water-wheels, over boards, 31 feet; length of wheel blades, 7 feet; depth of same, 1 foot 10 inches; number of blades, 27, and they are constructed of iron.

She is also supplied with one return flue boiler, whose length is 26 feet 3 inches; breadth (front), 13 feet; hight of same, exclusive of steam chimney, 11 feet 7 inches; location, on deck; number of furnaces, 2; breadth, 5 feet 9½ inches; length of grate-bars, 7 feet six inches; number of flues above, 6; number of flues below, 10; internal diameter of flues above, 1 foot 5 inches; internal diameter of those below, two of 22½ inches, four of 15 inches, and four of 17 inches; length of flues above, 18 feet 6½ inches; length of same below, 13 feet 2 inches. The diameter of smoke-pipe is 4 feet 4 inches; the boiler has no water bottom, and uses a blower to furnaces. The engine is fitted with H. Winter's patent expansive gear, and a variable cut-off.

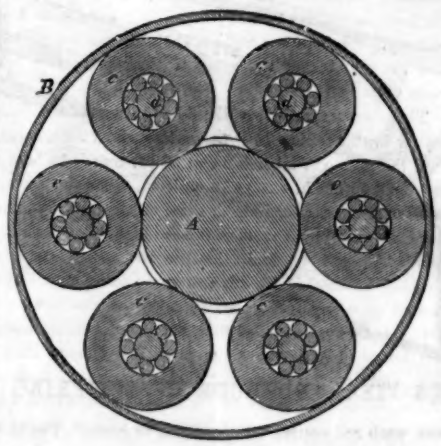
Her rig is that of a schooner. She has water-wheel guards fore and aft, and is well coppered. The bunkers are of wood, and she possesses one independent steam fire and bilge pump, one bilge injection, and the ordinary bottom valves to all openings in her bottom. The water-wheel guards are fitted with sponsons under them; the forecastle of this vessel is inclosed, and her promenade deck, saloon cabin, and state-rooms are very commodious and handsomely finished. The machinery of this steamer was constructed by the Morgan Iron Works, foot of Ninth street, East river, New York city.

The company owning this vessel is a new organization. They will furnish the only means of communication between the places above mentioned, excepting a weary line of stages at present traveling over hills and through woods a great portion of the distance. In addition to the travel which will naturally be created in the British colonies and the United States by the establishment of these facilities, it is confidently expected that considerable European travel will be secured by the line. Canadian passengers will undoubtedly find it a convenient route to Montreal by way of the White Mountains, whilst others can be left at Portland, within reach of all points of the United States, by railroad connections. The company have secured other steamers, which they soon expect to place on the same route.

PRATT'S IMPROVEMENT IN ANTI-FRICTION JOURNALS.

Friction is the greatest evil encountered in the working of mechanism. It not only consumes a large portion of the power, but it slowly and surely destroys the machine, involving all that vast amount of labor which is expended in the renewal of worn out parts. Could this power be arrested in its destructive work, a machine once made would last through all generations, forever. Though this consummation is not to be anticipated, the labors of thousands of active intellects directed to the task, are constantly diminishing the evil, and friction is being constantly reduced by new mechanical devices. The friction of journals, from the immense number of these in use, has been deemed of special importance, and many plans have been proposed and tried for lessening its amount. One of the most obvious of these is the interposition of rollers between the axle and the journal-box, so as to avoid the rubbing of surfaces altogether; a rolling friction only being encountered. A history of all of these plans would occupy too much of our space; suffice it to say, that in all of them some defect in detail has rendered them impracticable. We here illustrate a device, invented by William S. Pratt, of Williamsburgh, N. Y., which, so far as we can judge from its mechanical arrangement, and from a few weeks trial on one of our city railroads, seems to be the last link in the series of inventions necessary to make the friction *roller* journal a practicable device.

The annexed cut represents a cross section of the axle and journal-box, A being the axle, B the box, and C C C C C the friction rollers interposed; the axle being secured rigidly to the wheels, and the journal-box to the carriage. The rollers are made hollow and have the axles. *d d*, passing through them, which axles enter at their ends into two disks which are carried around the principal axle, A, by the rolling of the rollers, C C. In order to prevent the wear of the axles, *d d*, these are surrounded by sets of friction rollers as shown.



Friction balls are interposed between the ends of the axles and the external disks, while outside of these disks, between them and the stationary cap of the journal box, is a second set of balls, to relieve the axle of the friction upon its ends resulting from curves and inequalities of the road. The surfaces coming in contact should of course be made of cast steel or chilled cast iron, and a leather washer placed around the axle to exclude the dirt. No oil or other lubricating material is required.

We have seen one of these boxes which, it was stated, had run 1,000 miles, and it was not possible to perceive that it had experienced any wear whatever.

The patent for this invention was granted on May 8, 1860, and further information in relation to the matter, may be obtained by addressing W. J. Demorest, 473 Broadway, this city.

FRICTION ONCE MORE.

MESSRS. EDITORS:—On page 115 present volume of the SCIENTIFIC AMERICAN, I see an article from J. W. Sprague, under the caption of "Friction—The Philosophy of Small Axles," in which I, in common with a large number of practical mechanics, think the subject is not properly discussed, and therefore ask a place in your columns for a few remarks.

Friction as developed by motion is, I think, divisible into two elements; the first a raising of weight, the second a breaking of atoms. We have an illustration wherever there is friction, the protruding atoms of one surface enter the corresponding depressions of the other. This lock of the surfaces can only be destroyed by one of two methods; the first a lessening of their proximity, which must be by lifting the movable one; the other a breaking of the interlocked atoms.

The first of these elements is always present, as is proved by the peculiar motion of the moving body. The presence of the second is shown by the wearing away of the exposed surfaces.

If it were true that all resistance to motion offered by these locked surfaces is overcome by lifting the incumbent weight, which x will represent, then friction would be in a direct proportion to the time occupied in moving, and independent of the distance moved, for the aggregate length of the little falls will be dependant on the time which they occupy. If it were true that all this resistance is overcome by the breaking of particles or atoms, then the friction would be in a direct proportion to the amount of surface passed over, and independent of the time occupied. But since neither the one or the other of these suppositions is true, the friction is neither in a direct proportion to the space passed over, or the time occupied, but in some kind of a proportion to them both—considering all the time the incumbent weight equal to x. When the incumbent weight is changed, the proportion between the amount of resistance overcome by lifting and the amount overcome by breaking will be changed. Quality of metal, nature of lubricating material, velocity, and perhaps other circumstances, all tend to change this proportion. There being so many varying circumstances it would be difficult and perhaps impossible to give a formula for the calculation of the proportions in which these two elements, viz.: attraction of gravitation and cohesive attraction, are united in particular cases of friction.

EDWIN CRAIG.

Camden, Ohio, Aug. 21, 1860.

[Sound, common-sense remarks, that go right to the pith of the matter. Our correspondent will observe, however, that his classification relates only to the modes in which friction is overcome—in one case by breaking off the protruding particles, and in the other by raising the moving body over them. In whatever mode overcome, Morin's experiments, as well as those of other investigators, have settled these three laws of friction:—

1st. Friction is proportional to the pressure.

2d. That it is independent of the extent of the surfaces of contact.

3d. That it is independent of the velocity of motion.

The friction is independent of the velocity, but is proportional to the distance through which one rubbing surface passes over the other. Now, as the distance round a large axle is greater than round a small one, the amount of friction *at each* revolution is in direct proportion to the circumference of the axle.—EDS.

DRAUGHTING LESSONS, GRATIS.—Two large and wealthy associations in this city, will, this winter, give lessons, without charge, to applicants of all ages above fourteen in both architectural and mechanical drawing. The Cooper Institute lesson will be given in the upper story of the splendid building known by that name, and the Mechanics' Society School in the Mechanics' Library premises, 472 Broadway. This is the second winter in both institutions, and the instruction, last season, by the best teachers in the city, was availed of by several hundred persons, including journeymen mechanics and foremen. The example is worthy of imitation by wealthy societies in other cities.

THE FRENCH MEASURES INTRODUCING THEMSELVES.—Nearly all of our microscopists, in their communications to Silliman's *Journal* and other kindred works, use the millimeter as their measure, and in Cooke's "Chemical Physics," and other standard works, the meter and killogramme, as well as the degrees of the centigrade thermometer, are employed without translation. We are beginning to think seriously of adopting this course in the SCIENTIFIC AMERICAN. The people are running ahead of our legislators in making this great reform in our weights and measures.

THE SEWING MACHINE.—NO. II.

Henry Lye, of Philadelphia, obtained a patent, March 10, 1826, for an invention for sewing leather, but no record or model has been found in the Patent Office, or elsewhere, to indicate its character.

The next attempt at machine-sewing, so far as appears from the Patent Office, was made by Alexander Temple, whose model, deposited in 1841, we had the opportunity of inspecting recently. It is designed for sewing leather, the clamps being moved automatically, and the needle, double-pointed, passed through the work by means of reciprocating fingers, one on either side of the clamps. There is an awl to make a passage for the needle, and also devices which appeared to us to be designed to catch up the loose end of the thread, and other devices which seemed to be meant to draw up the stitch. A great deal of mechanical skill and ingenuity are shown in this machine, which has every apppearance of having been a good working model. No drawings thereof or specifications have ever been found, nor have any traces been discovered that the inventor took any further steps to procure a patent than the depositing of his model. The next in order is the invention of Mr. J. J. Greenough, to whom letters patent were granted in 1842. Since then, as appears from the list of patents, in our possession, more than 425 letters patent have been granted for improvements in sewing machines, and we doubt not that the rejected and postponed portfolios of the office contain at least 300 unsuccessful applications. Many persons will suppose that the art of machine-sewing has now reached its utmost perfection, but we have the best of evidence for stating that there is yet no cessation in the attempts at improvement, and each new business to which it is introduced suggests new mechanical arrangements. The results of this invention are truly brilliant in whatever direction we look.

If we attempt to get at the value in money of the annual saving it has already made in the United States, we become startled at our own calculations. It has been proved in the proceedings on the application of Elias Howe, Jr., for the extension of his patent of September 10, 1846, that about 200,000 sewing machines have been sold to factories and families. Say that only 75,000 of these are now in use and good condition, and that 30,000 of them are in daily use in shops and factories. One hand with a machine can do the work of five hand-sewers at a low average (the range is from 4 to 12), which ought to effect a saving, taking one kind of business with another, of twelve shillings a day. But we will call it only one dollar a day, or $300 a year for each machine. The result is $9,000,000 annual saving in the shop and factory.

If we reckon that the 45,000 machines which we have allotted to families are in use two days in a week, or one hundred days in a year, and effect a saving of one dollar a day while so employed (and no family that has one in use will call that amount too great), we have an annual saving of $4,500,000, and a total for the family, shop, and factory, of $13,500,000, which is saved annually to employers in the wages of labor. Here a question may be raised by some who will ask if the withdrawal of this large sum so suddenly from the working classes who used to receive it as wages, can be a benefit to them, and whether the nation at large can be said to prosper when thousands of industrious people are crowded away from their accustomed work into idleness and poverty, while the sums that once rewarded their toil are only directed into the wide pockets of the employer? This is not an abstruse question in political economy. It is a question only of fact, and we will see in the end that this machine, like the steam engine, the reaper, the spinning frame, and the loom, has opened new and smoother roads to the sons and daughters of toil, has cheapened many of the necessaries of life, and brought into useful and profitable labor many who before were unable to earn a comfortable subsistence.

We propose to illustrate this subject by quoting some of the facts collected in the case already mentioned, and in so doing we will also be able to inform our readers of the results to trade and manufactures which have been wrought by this little mechanical giant.

The cap manufacture in the city of New York amounts to 375,000 dozen annually. These could be made by hand for sixty cents a dozen—by machine ten cents a dozen, and better sewn at that. All the sewing on a cap is done by the machine, except putting in the lining and the fronts. Gentlemen's hats are now bound by machinery exclusively. We believe Singer first invented a method of doing this. His machine will bind a hat in one minute of time, while fifteen minutes are required in doing the same work by hand. The cost by machine is four to five cents a dozen, by hand-sewing, about thirty cents a dozen. The manufacture of hats in this city rises to about the same number as that of caps, 375,000 dozen.

Every person who can recollect buying a lady's gaiter ten years ago, will be able to contrast the amazing fall in the prices of that neatest article of attire for the foot. Our recollection is that the difference is one-half in favor of the prices of to-day. This is due chiefly to sewing machines, 5,000 of which are daily engaged in stitching boots and shoes in Essex county, Mass. These machines are usually owned by the operatives themselves, who are mostly women, and who do the work at their homes. They now earn twice or thrice the sum they could earn by hand, whilst the manufacturer has less damaged work returned to him; the work is stronger, and the cost is only one-fourth of the cost by hand-sewing. These advantages have so stimulated this business that it has increased three-fold within the last six years. The wages of labor paid in Massachusetts, in the boot and shoe business, is put at $5,000,000.

The clothing trade is now a respectable branch of business. There was a time when the cry of "slop-shop clothing" suggested only the distress, and poverty, and temptations which so cruelly beset the sewing-women of our city. We hope the night of their distress has passed and gone, and that the dawn of their prosperity has risen upon them.

There are several firms who do a business of a million a year in this trade. In light work, such as linen coats, &c., the saving of labor is about 50 per cent. In heavy work not so much, except on quilting, when the saving is often greater, and, indeed, some of the quilting done on fine coats by the machine could not be done by hand. There is no doubt that the vast increase of the clothing business is directly owing to this agency. We cannot give any reliable statistics of the extent of the trade, but we are satisfied that this city sells annually not less than $15,000,000 worth of ready-made clothing. Our city has by the aid of this machine so monopolized the clothing trade that it has been estimated that one-tenth of the manufacture of the United States is carried on here.

[To be continued.]

VENTILATE THE CHURCHES AND THE SCHOOLS.

[Communicated to the Scientific American.]

We have pointed out in our last number the necessity of ventilating the shop. Those observations apply not only to the tradesman's shop, but also to the workshop or factory. The fearful decadence of the health of such towns as Manchester, Oldham and Sheffield, which are in truth but congregations of workshops, is notorious; the pale, wan faces of the dwellers there too truly tell the want of pure, clean, fresh air.

Passing now from the private shop to public institutions, we are compelled to admit the same radical fault—the want of that element which is the "breath of life."

In the churches, schools and assemblies, people who go there suffer more or less from this evil. It is proverbial how persons, young and old, suffer from colds, bronchitis, and influenza, all of which are said to be "caught" when they return from some public place of assembly. The question naturally arises, how is this? The answer is that it is caused by the sudden change which the body undergoes in passing from a heated impure air to that of the natural temperature, containing also its proper proportion of elements. Man requires for his health one gallon of air every minute of his life; the individuals of a church congregation are rarely, if ever, supplied with a quarter of that quantity. Only at the cathedrals is the air space in proportion to the worshippers. A man of large lungs inhales about twenty five cubic inches of air at each respiration; he breathes eleven times a minute, and thus requires nine and a half cubic feet of air every hour. Now when there are a thousand persons under one roof (some of the metropolitan churches and chapels contain 2,500 persons) for a couple of hours, it is evident that twenty thousand cubic feet of air are required to supply that which is necessary for existence to those thousand persons in a pure atmosphere, so that, of course, a much larger quantity than that is required in order that a current can be established to remove the effete matter of exhalation.

"The evils of vitiated air are also more to be guarded against, because persons can live in it without being aware of its danger, so far as their sensations are concerned. When we enter a crowded assembly on a cold day, the air is, at first, repulsive and oppressive, but these sensations gradually disappear, and then we breathe freely and are unconscious of the quality of the air. Science, however, reveals the fact that the system sinks in action to meet the conditions of the impure air, but it does so at the expense of having the vital functions gradually depressed, and when this is continued disease follows." No disease can be thoroughly cured when there is a want of ventilation. It is related that illness continued in a family until a pane of glass was accidentally broken, and then it ceased; the window not being repaired, a plentiful supply of fresh air was admitted.

The practice of building sepulchral vaults under the churches was fraught with the greatest evil to the health of those who went into the edifice for sacred purposes. But, with few exceptions, it is now interdicted by the legislature; still a great deal has to be done. Nearly all the churches in the empire require some artificial means of ventilation to render them physically fit receptacles for the body during a prolonged service. The Sunday schools also, as a general rule, are very ill ventilated, and in the second hour the lessons are far worse rendered that in the first, solely arising from a semi-lethargic coma that comes over the pupils breathing a carbonic air, which has already done duty, and been inhaled by others several times. However it is to be regretted, it is yet true that people will sometimes sleep during the sermon. Now, the minister must not be twitted with this, for with the oratory of a Jeremy Taylor or a Tillotson, people could not be kept awake in an atmosphere charged with carbonic gas, the emanations of a thousand listeners. The churchwardens should ventilate the churches and see that the congregations have sufficient air for breathing; if people go to sleep, the churchwardens are more to blame than the preacher.—SEPTIMUS PIESSE.

THE REAL CAUSE OF BLASTED WHEAT.

MESSRS. EDITORS:—In answer to your correspondent, S. S. C., on page 163, present volume of SCIENTIFIC AMERICAN, asking the cause of wheat being "blasted," I would state that being raised a regular farmer, and having considerable experience, I am well satisfied that the preceding crop has little to do in causing the blast; bad seed is in general the cause. An old farmer in Tennessee had good wheat seed, known as "barrel seed," which had been proved to yield better crops than any other in the neighborhood; the result was, that everybody came to him for seed wheat. The old man getting tired of exchanging in this way, at last told his neighbors that they could produce "barrel wheat" themselves. The secret was, to take and strike the sheaves over the edge of the barrel, and what scattered off was "barrel wheat." The largest, best-matured grain coming off first.

That smut is produced by the use of seed not fully matured can be easily proved. Take a few bundles of No. 1 wheat in the early dough state, sow it, and it will produce a glorious crop of smut; but take from the same wheat when fully ripened, and sow it either after oats, corn, or clover, and the wheat will be good. Defective grain is only able to produce a stalk and start the grains, but not to finish it. Put such grain into a solution of blue stone and in a few hours the germ is dead; good grain will resist the power of the acid for a day or two. The only benefit to be derived from soaking wheat in blue-stone is, it destroys the germ of such grains as were not fully ripened.

In these fast times every one is in a hurry; and hence, in order to meet the market, it becomes necessary to take up the hoe-cake before it is done, so as not to be *left* by the *cars*.

Those who believe me to be mistaken can prove for themselves, it is an easy experiment. N. A. P.

Kingston, Tenn., Sept. 25, 1860.

THE POLYTECHNIC ASSOCIATION OF THE AMERICAN INSTITUTE.

[Reported expressly for the Scientific American.]

The usual weekly meeting of this association was held at the Institute rooms, on Thursday evening, 26th inst; Professor C. Mason presiding.

MISCELLANEOUS BUSINESS.

Lithoconia.—Messrs. Taylor, Wood & Ladd presented to the club specimens of their new plastic compound which they call "lithoconia," and which is manufactured on a large scale at Roxbury, Mass. The chief application of the material is as an artificial stone for ornamental purposes, as for cornices, brackets, statuary, &c. The exhibitors stated that it had been extensively used in Boston, for window caps, and for that use it was furnished at about half the cost of cut stone. By a variation of the proportions of the ingredients, the material is suited for picture frames. The articles exhibited were marbleized table tops, picture frames, and fancy ornamental pieces. In answer to inquiry of the president, the exhibitors stated that they had made application for a patent, and were, at present, unwilling to communicate the particulars of their process.

Mr. Garvey—Artificial compounds like this on exhibition have, for a long time, been well known, and in common use. Fibrous materials, of almost every sort, are easily cemented by means of oil and glue, or solutions of gums, and make an excellent substitute for wood. An example of this class of compounds is papier maché. For artificial stone, scagliola (a mixture of whiting and glue) has been a long time in common use. It can easily be pressed into any desired form, and may be colored or highly ornamented by painting and gilding. It has been much used for outside work, but has lately given place to terra cotta, which is almost as durable as natural stone. Any artificial stone should be homogeneous in composition and colors, for the reason that if the surface is broken they will not show the cheat.

Mr. Seely—The useful qualities of these artificial compounds often depend as much upon the details of manufacture as upon the nature of the ingredients. Shellac and sawdust, under ordinary treatment, would make a compound of little value; but being thoroughly mixed of a proper consistence, and pressed, by hydraulic pressure, into steel molds, it gives the beautiful "union cases" which are so fashionable with the daguerrotypists.

The President—In Ulster county, we have lately found building stone of the very best quality; I prefer it to white marble.

Aniline and Coal Oil.—Dr. Stevens exhibited about two dozen samples of silks and delaines dyed with the above compounds. The colors are of various tints of red, purple and lilac. The Doctor remarked that aniline, the base of all these colors, is one of the products of the distillation of coal, and may always be found in coal tar and crude coal oils. The great value of these dyes, beyond their brilliancy, is the fact that they are permanent, a quality which was long sought for in vain. The famous Tyrian purple from the shellfish *murex* was considered a fast color, but its cost and its limited supply have kept it out of use in modern times.

Mr. Seely—Aniline and its compounds which are used as dyes have been known for a long time among chemists, but were regarded only as substances of scientific interest; their utility as dyes, however, is a discovery which has been developed within a year or two. Coal tar and crude coal oil are made up of about forty different compounds, acids, alkalies or bases and neutral substances. Among the acids is creosote; the alkalies, ammonia, and the neutral substances, coal oils. Aniline is one of the alkaline substances, and, according to the French chemists, in its chemical character is similar to ammonia. It unites with acids and forms salts, and it is solutions of these in alcohol which are the dyes. Thus, the *maure* dye is a chromate of aniline, and the *solferino* is similar in its constitution to ammonia-sulphate of copper. In coal tar the aniline is in such a small quantity that it is impracticable to separate it unless at the same time, the coal tar is treated for other more important purposes. It is, however, obtained in abundance from benzole, which is the lightest of the coal oils, by a chemical process which is not difficult for a skillful chemist. The new colors are extremely popular with the ladies, and all the dyers will, no doubt, be anxious to learn the new improvement in their art.

The President—Wherein consists the peculiar virtue of coal over other oils?

Mr. Seely—I think it lies mainly in the fact that they are neutral substances. They have no affinity for oxygen at ordinary temperatures, and they will not become resinous or rancid; they are almost as unchangeable as water.

Dr. Stevens—I have found the practical difference to be that if you spill coal oil on a carpet, no harm is done; while if it be fish oil, an indellible stain is left. [Laughter.]

Electric Telegraphs.—Mr. A. E. Parks, of Williamsburgh, exhibited a model of a new recording instrument which would operate with twice the rapidity of the Morse instrument. At the suggestion of the president, Mr. Parks will bring his instrument at another time, and an examination of it will be made by a standing committee.

The president here called up the regular subject, "Expansion of Steam."

DISCUSSION.

Professor Hedrick, chairman of the committee to report on the Cherry-street experiments, said that the committee had as yet had no formal meetings, that the experiments were still in progress, and that, without doubt, next week the final report would be presented. He preferred to leave the opening of the discussion to his colleagues.

Mr. Dibben presented a mathematical calculation substantially as follows, which he considered elucidated the whole subject as far as theory could go. The mechanical value of the heat required to raise 1 lb. of water 1° is 772 avoirdupois foot-pounds. If 1 lb. of water (27.7 cubic inches) at 32° be converted into steam at 212°, the space occupied by the steam will be 46.230 cubic inches, and the heat used in raising the water into steam will be 1,170° or units. 1,170 heat units are equivalent in force to 903.240 lbs. raised 1 foot in hight. The amount of heat required to convert the 1 lb. of water into steam is not affected by the amount of pressure of the atmosphere, or otherwise, except in an indirect manner. If a constant resistance of 15 lbs. to the square inch be opposed to the expansion of the 1 lb. of water into steam, the resistance overcome will be 58.956 foot-pounds, which is 74.9 units of heat force. 1,170 units in all were employed, and of these, 74.9 were realized in power, while the 1,095.1 units still remain to keep up the condition of elasticity. In other words, 74.9 units of heat did the work, were converted into so many units of mechanical available force. And these 74.9 units are all the work which can be realized in the method described. Mr. Dibben then proceeded to show that, by using the steam expansively, a much larger percentage of work will be realized, or that more of 1,170 units of heat than 74.9 can be converted into power. The basis of his calculation is given above, and by using it, those who have a little skill in mathematics will arrive at the same conclusion as Mr. Dibben does, that there is a large theoretical and practical gain by the use of steam expansively.

After Mr. Dibben had concluded, a rapid and somewhat rambling conversation took place between various members till the time of adjournment.

MACHINE FOR SAWING SHIP TIMBER.—The construction of a machine which should saw timber with all the various curved, beveled and winding surfaces required in building a ship has enlisted the efforts of the very first engineers of the world, including such men as the famous Brunel, but the difficulties of the task have baffled their powers. H. S. Vrooman, of Hoboken, however, has taken the matter in hand, and he now has a saw in operation at No. 355 Washington-street, this city, which accomplishes the work in the most perfect manner conceivable. The saw is hung in a turning and sliding frame, and is controlled by two guides, one of which determines the curve and the other the bevel. The adjustment of these guides to the form of surfaces cut have that perfect precision which is characteristic ot machine work. The invention is well worth the attention of shipbuilders and furniture manufacturers, and indeed of all who are interested in novel and ingenious mechanism.

A COLUMN OF VARIETIES.

When the Croton aqueduct was in process of construction, the writer of this walked into it 440 paces, and his companion stepping into the mouth, we found that, standing thus just a quarter of a mile apart, we could converse without any difficulty in whispers.

The condensed air of a crowded room gives a deposit which, if allowed to remain a few days, forms a solid, thick, glutinous mass, having a strong odor of animal matter. If examined by a microscope, it is seen to undergo a remarkable change. First of all, it is converted into a vegetable growth, and this is followed by the production of multitudes of animalcules; a decisive proof that it must contain organic matter, otherwise it could not nourish organic beings.

Coal oil has the remarkable and very valuable property of never becoming rancid. All other oils—vegetable and animal—absorb oxygen and decay; but all the neutral oils derived from coal are permanent compounds like water, and do not experience corruption or change from time and exposure.

The orbits of the 59 asteroids that have been discovered revolving between Mars and Jupiter are so interlocked with each other that, if they were represented by iron hoops, the whole could be suspended by any one.

It has been ascertained that the heat produced by the burning of any substance is just in proportion to the amount of oxygen which enters into combination with the burning body. A pound of hydrogen, in burning, combines with eight pounds of oxygen and generates more heat than the burning of an equal weight of any other known substance.

D. W. Farr, in a recent letter to the Registrar General of England on the causes of deaths in 1857, notes that the happy decrease in the danger in child-bearing continues; 42 mothers died to every 10,000 children born alive in 1851; in 1847 the proportion was 60; in 1848 it was 61; and since that date the mortality has regularly declined year by year, leaving the average loss in ten years 51 mothers to every 10,000 children born alive. This branch of medicine, he adds, is cultivated in the present day with extraordinary zeal by men of superior ability.

Mr. Calvin Adams, of Pittsburg, Pa., has recently discovered that an important electrical change takes place when molten iron solidifies in cooling. By insulating molds, and the workman who pours in the liquid metal, the castings from common iron come out as white as silver and as hard as steel. This is another evidence of the universality of this subtile force, and though it is not yet applied to any practical purpose, such phenomena cannot fail eventually to produce useful effects.

M. Pasteur and M. Pouchet are carrying on a lively discussion in France as to the possibility of spontaneous generation. M. Pouchet positively proves that the thing is impossible, while M. Pasteur proves as positively that it is not only possible, but that he does it.

The Geographical Society of Paris offers a prize of $1,600 to the traveler who shall first travel from Senegal to Algeria, or from Algeria to Senegal, by way of Timbuctoo.

A few weeks since a very sudden and extraordinary rush of the tide occurred on the west coast of Ireland and Scotland; most probably caused by the falling of a large meteor into the Atlantic ocean.

At the recent meeting at Dorchester of the Bath and West of England Agricultural Society, Lord Portman stated that the elm planks which were taken up out of the Thames previous to the building of the new London Bridge were quite sound, although they had been in the water 800 years.

We are acquainted with more than one intelligent inventor who, aware that in the best steam engines of the present form only about one-tenth part of the power of the fuel is utilized, are busy in devising engines of a radically different model, which they hope will yield several fold more power with the same fuel.

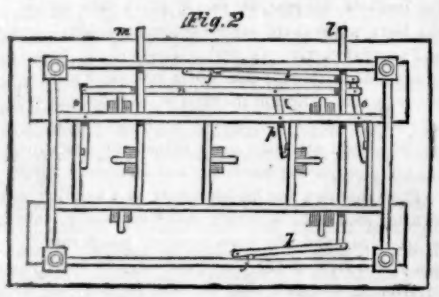
Chemical researches by Mr. J. Salisbury, of Albany, show that good varieties of the apple are richer in those substances which strictly go to nourish the system than potatoes are; or, in other words, to form muscle, brain, nerve; and in short, to assist in sustaining and building up the organic part of all the tissues of the animal body.

IMPROVED WOOL FOLDER.

The folding of the millions of fleeces of wool that are annually produced in the country is a labor of no small magnitude, and any apparatus which materially facilitates this labor is of corresponding value. Wool folders are not a new invention, and the one here illustrated claims merely to be an improvement on those heretofore in use.

The general arrangement of this folder will be readily understood by a glance at the perspective view, Fig. 1. It consists of a table with folding leaves, which are pressed upward into a vertical position by spiral springs. These leaves are all folded down in a common plane with the surface of the table where they are held by spring catches; the fleece being then spread upon the table with the outside uppermost, and gathered into as small a compass as can be conveniently done with the hand, the two long leaves, A and B, are released from the catches which hold their outer edges down, when the spiral springs press them up into the vertical position represented in the cut. Three narrow leaves are arranged to rise into a vertical position between the long leaves, A and B, and after the latter have been turned up as described, and fastened together by hooks, the narrow ones are successively released; first the two outer ones, *c* and *d*, folding the ends of the fleece inward, and then the inner leaf, *e*, again rolling forward

Fig. 2



the fold which has been turned upon it by the leaf, *c*. The fleece being thus compressed between the four leaves, A, B, *e*, and *d*, rests upon a movable platform which is supported by the rod, *f*, so that it may be pressed upward by placing the foot upon the treadle, *g*.

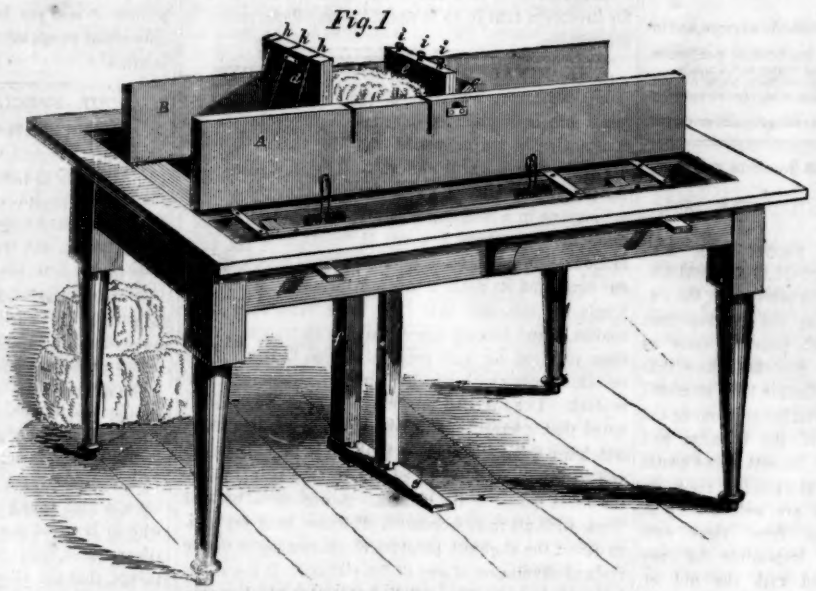
Before the fleece is placed upon the table, the twine for tying it is arranged through the holes, *h h h*, and *i i i*, in the manner shown, so that as soon as the fleece is folded the twine is tied, and thus the wool is secured in a neat, snug bundle, ready for transportation to market.

The mode of releasing the catches from their hold upon the edges of the folding leaves is clearly represented in Fig. 2. The catches, *j j*, which hold down the edges of the large leaves, are fastened to the levers, *k k*, which are connected with the rod, *l*, so that by pressing this rod inward towards the table, the catches, *j j*, are forced from their hold. The lever, *m*, is next pushed to the left, which, through the interposition of the rod, *n*, actuates the two levers, *o o*, and releases the catches, of the two outer narrow leaves. Then a pressure of the rod, *m*, in the opposite direction moves the lever, *p*, and draws the catch of the inner narrow leaf from its hold.

As soon as one fleece is folded, the leaves are pressed back into place by hand, the twine re-adjusted, another fleece laid upon the table, and the operation repeated.

The patent for this invention was granted on the 15th of March, 1859, and further information in relation to it may be obtained by addressing the inventor, Randolph M. D. Edwards, at Tecumseh, Mich.

Fig. 1

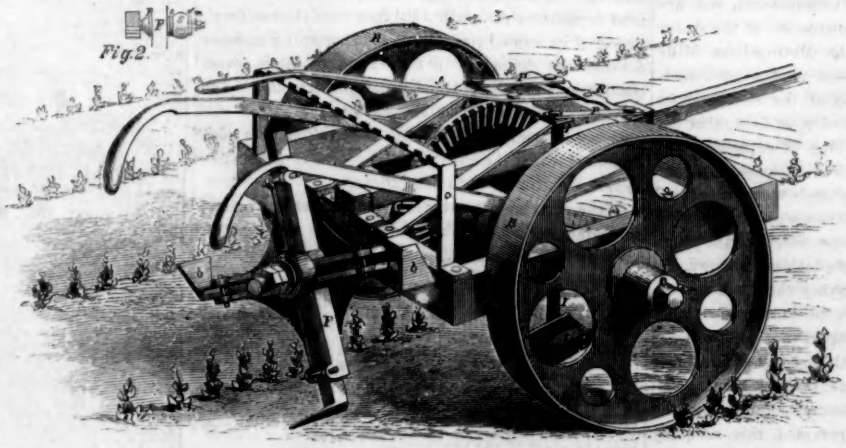


EDWARDS' IMPROVED WOOL-FOLDER.

IMPROVED COTTON CULTIVATOR.

In raising cotton, the seed is planted in rows the proper distance apart to enable the plants when they are grown to completely cover the ground, so that the better the land the farther apart must be the rows; they are made about three feet apart in the poorest land, and six or seven in that of the best quality. On the sides of hills it is the general practice to run the rows around the hill in order to keep them in horizontal lines, and prevent the soil from being washed away by the rains. As soon as the plants are up, the soil is scraped away from the rows towards the middle of the space between them, and the plants are thinned so as to leave a suitable number for the land to support. The scraping is done by a kind of plow (drawn by a horse or mule) which is passed on each side of the row, thus going twice between every two rows. The thinning is performed by a laborer with a hoe.

Fig. 2.



GATLING'S IMPROVED COTTON CULTIVATOR.

The machine which we here illustrate is designed to scrape both sides of the row at once, and to thin the plants at the same operation; thus enabling one hand to do the work of two in scraping, and of ten or twelve in thinning. The two moldboards or scrapers, L L, are fastened to the lower ends of the vertical rods, J J, so that by turning the rods the points of the scrapers may be varied to conform to the curves of rows in passing around hills. To the upper ends of the rods, J J, are fastened (at one end) the levers, P P, which have their opposite ends connected by a bar, R; this bar being pivoted to one end of the lever, T, so that, by moving this lever horizontally, the directions of the scrapers may be varied at pleasure. As the machine moves along astride of a row, with the two scrapers operating on both sides of the row, the four knives or hoes, *b b b b*, are carried around by the revolutions of the cutter-head, F, each knife as it comes around taking out plants to the extent of its own width in the line of the row. The cutter-head is caused to revolve by being connected by gearing with one of the driving wheels, B. It is fastened upon its shaft in such manner as to allow the shaft to turn in its center in case one of the knives strikes a stump or other rigid object, thus preventing the machine from being broken. This mode of fastening is illustrated in Fig. 2. A shoulder, K, is secured rigidly to the shaft, and the two collars or washers, *o o*, are slipped loosely on the shaft outside of the cutter-head, with the india-rubber spring, S, between them; the whole being held in place by the nut, *m*. The cutter-head itself is loose on the shaft, and is carried by the pressure of the washer, *o*, against it, which pressure may be regulated at pleasure. Consequently, if sufficient resistance is encountered, the shaft will turn in its hole through the cutter-head, without turning the latter. This is a very important feature in this invention to prevent the implement from being broken by careless handling. The depth to which the knives cut is adjusted by slipping the rods to which they are fastened a greater or less distance inward or outward along the arms of the cutter-head; when they are held in place by two bolts, one of which is of wood, so that it may be broken in case the knife meets too great resistance for it to overcome.

When we consider the immense extent of the cotton culture in this country, and the large proportion of the labor which this machine is calculated to save, we may perhaps form some idea of its great value. It is the invention of a Southern man, a practical cotton grower, who has no doubt that it will accomplish its work in an entirely satfsfactory manner.

The patent for this invention was granted July 3, 1860, and further information in relation to it may be obtained by addressing the inventor, R. J. Gatling, at Indianapolis, Ind.

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NEW YORK, SATURDAY, OCTOBER 6, 1860.

WHAT MAY BE LEARNED FROM THE EXPERIMENTS AT THE METROPOLITAN MILLS.

HE letters in relation to the experiments at the Metropolitan Mills, which pour in upon us from every direction, show that these experiments have attracted a very general interest among the engineers of the country, and while this interest alone would prompt us to examine them, we think they are well worthy of examination from their own intrinsic value. It is almost impossible for any experiments which are conducted with the aid of actual weights and measures, to be wholly barren of results, either in the way of confirming conclusions already obtained or of modifying them. Wherefore, we have great respect for experiments, deeming their conclusions more reliable than those of any process of reasoning, with the single exception of mathematical demonstrations. It requires however the action of reason to determine what is the lesson which any experiment does really teach, and it seems to us that there is one truth which is demonstrated, not, indeed, for the first time, but with new force by the experiments at the Metropolitan Mills.

First, however, let it be remarked, that these experiments show beyond the reach of question, that engines constructed precisely like those that were there used, driving a flouring mill under exactly the same circumstances that there obtained, do not run more economically with cut-offs than they do without. From this single fact, thus absolutely proved, the general conclusion follows that whether the economy of running an engine will be promoted by cut-offs depends upon the construction of the engine and the service that it has to perform.

The great truth, however, of practicel value which is impressed with renewed force by these experiments, is the importance of perfection of arrangement, and accuracy of wormanship, in the construction of the steam engine. The engines used at the Metropolitan Mills were regarded by practical engineers as of a good quality, and yet from the strangling of the steam on its passage from the boiler to the cylinder, or from other defects in the arrangements, the value of expansion was completely overwhelmed. This was the case to a considerable extent in the Smithery engine used by Chief Engineer Isherwood, in his experiments at the Brooklyn Navy Yard, and he points out these defects in the plainest and fullest manner. And here let us state very distinctly that those who are denying the economy of working steam expansively, have no warrant for citing Mr. Isherwood's authority in support of their position. On the contrary, he recognizes this economy fully, and in his learned, able, impartial and truth seeking discussions of his own experiments, he calls attention to the several circumstances which prevented this economy from being more completely realized. We differ from Mr Isherwood in some of his theoretical positions, but we are compelled to admire the manner in which he handles the whole question; and we commend his work to engineers of the country as being full of valuable instruction.

The importance of wise arrangement and nice workmanship in the steam engine is shown not merely by these experiments, but by the whole of its history. The very best engines that have ever been constructed utilize only about one-tenth part of the power of the fuel, while those at the Metropolitan Mills, which are probably of average quality with engines of that size in general use, yield only about one-seventieth part of the power of the fuel. Notwithstanding the immense amount of study and contrivance that has been expended in efforts to bring the steam engine to perfection, it would seem to be still one of the most promising fields for invention that is to be found in any department of mechanism.

THE FINAL DESTINY OF THE EARTH.

Encke's comet, which revolves about the sun in 3½ years, has been observed to complete its revolution in a constantly shortening period, showing that it is being drawn inward towards the sun. This fact has led to the general conclusion by astronomers that the planets are moving in a resisting medium, far more attenuated than our atmosphere, but still sufficient to affect their motions. If this is so, it follows by strict necessity that our earth and its sister orbs are all winding spirally towards the sun, and that they must eventually strike against it and become incorporated with its mass. The time required for this purpose belongs to those inconceivable periods with which geology and astronomy have to deal. The resisting medium is so exceedingly attenuated that it exerts but a slight influence on the comets, which are themselves masses of the very thinnest vapor, and its influence would of course be very much less on the dense matter of the planets. Astronomical observations, with all their wonderful delicacy, have yet failed to detect the slightest progressive shortening in the periods of revolution of any of the planets. It is curious, however, to note the multiplied obstacles which prevent the perception of this fact, if it does exist. All the *measures* of these revolutions are shortening with the revolutions themselves. If we begin, for instance, with the earth, the problem is to ascertain whether the time occupied by the earth in its journey around the sun is gradually becoming shorter. The first plan that suggests itself is to compare this with the rotation of the earth upon its axis, to see whether the year occupies the same number of days and hours and seconds that it did in former times. But if the earth is gradually cooling, it is contracting in size, and its rotations on its axis are becoming more rapid; in other words, the day is shortening with the year; and if the measure shrinks just in proportion to the thing measured, we cannot tell whether the latter is becoming shorter or not. If we take the time of the revolutions of the moon around the earth as a standard, the same resisting medium would draw the moon towards the earth and shorten the month also with the year. If we resort even to the less satisfactory measure of the sun's rotation on his axis, his bulk is also diminishing by the radiation of his heat, and the period of his rotation is consequently becoming shorter. In brief, from the two causes of radiation and the resisting medium, all the times and distances which could be used to measure the earth's distance from the sun (or the period of its annual revolution) are shortening together. So that the *differences* in the extent of these several contractions are the only means left for detecting by observation the approach of the earth to the sun, if such approach is really taking place. These differences would doubtless reveal themselves in the course of generations to refined astronomical observations.

If the earth and the sun are gradually becoming cold, this winding of the earth towards the sun would tend to keep up its warmth, and it may be a wise provision for prolonging, by some millions of years, the continuance of animal life upon our globe. But this period must come to a close, for if there is a resisting medium pervading the space between us and the sun, the final destiny of the earth is to curve gradually inward till, with a velocity hundreds of times greater than that of a cannon ball, it dashes itself with an awfully sublime crash into the mass of the sun.

ROOM FOR IMPROVEMENT IN THE STEAM ENGINE.

The unit of heat is that which is sufficient to raise the temperature of one pound of water by one degree of Fahrenheit. The unit of work is the raising of one pound weight through a vertical hight of one foot—called a foot-pound. The experiments of Mr. Joule, of Manchester, indicated that if the whole of the heat could be rendered available, a unit of heat would raise 772 pounds one foot high; in other words a unit of heat is equal to 772 foot-pounds. This is called Joule's equivalent. A pound of charcoal will raise 78.15 pounds of water 180 degrees, which is equal to 14,067 units of heat. This multiplied by 772, gives 10,859,724 foot-pounds, which is equal to the production of 5½ horse power from the combustion of one pound of charcoal per hour. As the best engines consume nearly two pounds of coal per horse power per hour, it follows that only about one tenth part of the gross power of the fuel is utilized.

OUR SPECIAL CORRESPONDENCE.

OHIO MECHANICS' INSTITUTE FAIR.

CINCINNATI, Ohio, Sept. 15, 1860.

MESSRS. EDITORS:—For seventeen years in succession, the exhibition halls of the Ohio Mechanics' Institute have been thrown open to the public of the Queen City. In that time how many inventions now in general use, have been first timidly offered for public inspection under its auspices, and how many others which were sprung upon that public with specious promises of utility have died the natural death of humbugs, who can tell? These institutes for the aid of artisans are so many nursing mothers of genius, talent, industry, and mechanical skill; and it is safe to say, that no one which has been managed as this one has, could have lived through a seventeen years succession of annual displays without becoming a national blessing. We all remember the rich young girl in Sue's "Mysteries of Paris," who so honored the artisans who fashioned her costly silver vases, and furniture, and carriages and other things, that she allowed only their names, and not those of their employers to be inscribed upon them. So at these public displays of mechanical skill, the real worker may reap the honor due him for his work, before he loses his individuality in the shadow of the large manufacturer who may employ him.

The number and variety of articles on exhibition at the Institute this year, are said to much exceed those of the last; while there are some things of novel design and peculiar merit. Of course, it would be impossible to compress within the limits of a newspaper article, fair or even unfair notices of the mass of inventions on view; all that can be done is to note in meager outline those which attract attention as we thread our way through the maze of moving machinery and stationary things.

The exhibition was held last year in a building, constructed under the direction of the committee, entirely of gas-pipe; and this novel structure which rose to the astonished view of the Cincinnatians, like some palace of Alladin, was sold after the fair, for a goodly sum. This year the directors secured three floors of the Catholic Institute, and the hall of the Mechanics Institute which adjoins it. There are several rooms devoted to machinery and manufactured articles; a long and spacious picture gallery, well filled with some pictures of all the fashionable styles, and oil pastel and crayon pictures by resident artists; and, at the top of the building, a grand concert room of magnificent proportions, all filled with articles of use. In the center of this vast saloon water jets in ceaseless flow from a fountain of graceful shape, and the echoes of the plashing drops ring along the arched ceiling and through the room with pleasing effect.

As we enter the main door of the first machine room on the lower floor, our attention is first attracted to three single cylinder printing presses from Wells' typefoundry, and to some beautiful fire proof safes from the shops of Dodd & Co., and Hall, Caryl & Co., which are finished with bronzing and flower painting to a degree that I never saw equaled. The exhibitor representing one of these firms, expressed an ardent wish to come in competition with our leading New York safe men, and remarked that it somehow strangely happened that none of them cared to venture on here with the goods to show against them. It may be that Lillie and Herring will say, as Morrisey does to Heenan, that if they wish to stir up a combat, it will only be necessary for them to give the provocation.

Almost every visitor as he moves along, stops to see the practical operation of Hill's and Porter's governors, which all through the evening are kept whirling around like dancing dervishes. Porter's is a centrifugal governor on a new principle, as all readers of the SCIENTIFIC AMERICAN will recollect, for it has been illustrated and

described in our columns quite recently. Perhaps, for the benefit of subscribers in foreign countries, who may not have received their numbers regularly, it may be well to say that it is a ball governor, the balls being very small, and revolving with much greater velocity than is usual, their centrifugal force being partly counteracted and balanced by a weight hung around the shaft. It is exceedingly sensitive and prompt in its action.

Sanborn's book-binders backing machine is a capital thing for the purpose. The machine on exhibition is as finely finished a piece of work as one would care to see, and it has the advantage over the one made last year, of being much stronger throughout. Mr. Sanborn also shows a book-piercing machine for power. A cam on a shaft raises a crossbeam, in a slot in which are fixed piercers at any required distance apart, and the work is done with neatness and dispatch. For binders who do not require a machine run by power, there is one of a smaller size to be worked by a treadle.

J. B. Mooney, of Cincinnati, has a machine for cutting bolts. The bolts are passed through a hollow spindle and into a pair of clamps, and the dies are so constructed as to cut with one motion. It obviates the fitting-up of dies, as a straight steel will do by putting a thread on. The barrel machinery of Smith & Gouchers must be capable of doing capital service in the oil region of Pennsylvania, if the specimens, consisting of cisterns and tanks on exhibition here, are of its production. Certainly no one could desire neater nor better fitted work than they exhibit. Steptoe & McFarlane show a tennoning and a molding machine of elegant workmanship; and John Lemon, of Cincinnati, a hoisting apparatus which merits a notice. The platform travels up and down between the guides by means of a rack and pinion, while an endless belt running from the top to the bottom of the building is driven by the engine. All danger of the falling of the platform in case the belt should break is obviated, since it is sustained by the rack and pinion; and supposing that the belt shifter should fail to work when it might be desired to stop at a given point, the man on the platform can still control its progress by slacking the belt by means of an ingeniously contrived lever placed close at hand.

Attracted by a knot of persons gathered about some object of interest, I pushed my way through and found one of your foster children at its work. The machine for making stove pipe, invented by M. C. Root, of Toledo, and patented through your office, seems to be capable of doing at one operation what our tin-smiths are now doing at five. The usual routine followed in making a length of stove pipe, is, first, to turn the edge with one machine; second, to form the pipe with another; third, to make the seam by hand; fourth, to draw the end in by hand; and fifth, to put on the swedge or bead. These various details are merged into one operation by the ingenious Mr. Root. He has arranged four rollers—three in a line, and one back of them. The sheet is passed between the middle and lower rollers where it gets its edge and groove, then it goes over the middle and back rollers, and under the top one by which time the pipe has been formed, its seam flattened, been bearded or swedged, and the end contracted, which completes the operation, and turns it out as neat a joint of stove pipe as you ever saw in your life. The machine is worked by a crank and treadle, does the work of three men, and costs only $40.

One corner of the grand saloon, up stairs, is occupied by an extensive display of carved rose-wood and walnut furniture, from the shops of Mitchell & Rammelsberg. In the very foreground of this collection of household luxuries, is a walnut arm-chair, in which the Cincinnati people hope Baron Renfrew may sit when he comes here in the course of his travels. The back is surmounted by the royal arms of Great Britain, carved in the wood, and supported by graceful columns around which are entwined various appropriate emblems. The covering is of silken damask, and in the piece which covers the stuffed back, are woven the same insignia of royalty.

William Wood & Co., of this city, make a fine show of paints, which are said to be fair samples of the articles they sell. One of the jury of award who has had this department under investigation, informs me that in quality and tone these paints are, if anything, superior to those we make in New York, and that there is actually no necessity for western men to be any longer dependent upon the metropolis for their supplies. The cases of philosophical instruments from the manufactory of James Foster, Jr., would do credit to Pike, or even old Sol Gills, that wonderful gentlemen, who, we are told by Cap'n Ed'ard Cuttle Mariner, of England, could make a watch. Mr. Foster's skill is further shown in the "chronograph" invented by Professor Mitchell, for measuring time during his astronomical observations at the Cincinnati Observatory.

T. Bass, whose sign-card hung on the heap of baskets here, shows that "they are home-made," certainly deserves credit for his selection of the willows from which the large and small baskets and bird-cages are made, as well as for the admirable workmanship which they indicate him to possess. It may well be a question for our farmers to discuss, whether it is worth our while to pay Germany and France something like a million dollars annually, for willow and willow-ware, when the articles can be produced as cheaply and good as they are abroad.

Miles Greenwood for some cause or other, doubtless from press of more important business, makes a small show of his goods this year. There is a case and some loose samples of beautiful brass castings, and a new valve in the lot is both novel and excellent, but in comparison with what he might have done, his contribution to the Institute this year, is but a drop in a bucket. Mr. Greenwood took hold of Fawkes's steam plow last year, and improved it very materially, I hear. The plow-frame is now made of angle iron instead of wood, as formerly, and works much better both for raising and lowering as well as draft. The machine has been down to Mr. Sullivant's mammoth farm in Illinois, where Fawkes has contracted to break a thousand acres this season. He has finished threshing about ten thousand bushels of wheat for Mr. Sullivant, and has more work of the same sort laid out.

RECENT AMERICAN INVENTIONS.

COMPASS PROTRACTOR

The object of this invention is to produce an instrument which enables an inexperienced hand, and also a person not acquainted with the manner of making a calculation, to take the necessary observations for the purpose of determining the ships course to a given point, or the bearings of surrounding objects, or the position of the ship from bearings; and the invention consists in the combination with ordinary parallel rules of a movable circle, graduated as a compass and provided with a semicircular opening with the exact center of the circle, marked therein in such a manner, that by the combined operation of said circle and the parallel rules, all the operations for the purposes above stated, can be made in a simple and easy manner, and without the necessity of any calculation. F. H. West, of San Francisco, Cal., is the inventor of this instrument, and he has assigned his full right to F. S. Seabury, of Stoney Brook, N. Y.

SADDLE TREE.

The object of this invention is to obtain a gig saddle tree, by which a saddle tree may be constructed to fit any horse, and thereby avoid injuring or galling the back of the animal, a contingency of frequent occurrence as saddles have been previously constructed. The invention has for its object the simplifying of the manufacture of gig saddles, especially those of a superior kind, and to render the same more elastic and neat in appearance, stronger and more durable than usual, the invention being applicable to all kinds of gig saddles, such as silvered and japaned seats, jocky-covered seats, &c., This invention was patented to S. E. Tompkins, of Newark, N. J.

ATTACHING HANDLES TO SAWS.

The object of this invention is to attach handles to a cross-cut saw in such a manner that they may be firmly secured to the saw, and at the same time admit of being readily removed when necessary, in order that the saw may be drawn longitudinally from the kerf when the log presses or binds against its upper surface, and prevents a vertical withdrawal of the same, a contingency which always occurs where the log is not supported so that its outer ends will fall when the cut is made, and this cannot always be effected, especially with large logs, which are mostly sawed on the ground. This improvement was designed by Isaac Pelham, of Ithica, N. Y.

REPORT OF THE TRIAL OF STEAM FIRE ENGINES AT RENSSELAER COUNTY FAIR, TROY. N. Y.

[Reported expressly for the Scientific American.]

On Thursday of last week, the principal steam fire-engine builders assembled at Troy, N. Y., for the purpose of testing the merits of their several machines, and to arrive, if possible, at some definite conclusions respecting the merits of the various plunger and rotary pumps employed by them. The day set apart for the trial was the 27th ult., and at the hour specified the several engines made their appearance on the grounds, drawn either by hand or horse-power. We have not room for the meteorological report of the Smithsonian Institute, which was taken for us, but the wind was light through the day, except at intervals, when it blew quite fresh from the West; indeed, had the day been specially selected from the year, it could hardly have been finer for the purpose. The sky was covered with sullen clouds until nine o'clock, when, having relieved themselves of a slight shower, they partially cleared away. The prizes to be awarded by the Fair Committee, of which William E. Hagan, Esq., was chairman, amounted to $100, $75 and $50. In addition to these, it was announced from the judges' stand that the citizens had contributed $200, to be awarded as the Fair Committee thought proper. Two tests of each engine were to be had—one to play from the pipe through 50 feet of hose, using such nozzles as the exhibitors pleased, for 30 minutes from signal. The other test was in the case of first-class engines, to pump, through 800 feet hose, 18 inches against time, out of a tank 15 by 22 feet in measurement, and not quite three feet in depth. In respect to the second class pumping on quantity, they were to work on the tank for 15 minutes from signal; the amount of water discharged in that time to be estimated by the judges. The exhibitors were allowed 15 minutes from the tap of the bell to get ready. At the second tap they were to start fire and play for 30 minutes, as previously set forth.

The engines entered for competition were as follows, in the order of playing:—Messrs. Lee & Larned, Novelty Works, New York City—Self-propelling steamer *Niagara*; weight, 11,500 lbs.; size of steam cylinders, 7½ inches diameter by 14 inches stroke; capacity of pump (Carey's rotary), 1,200 gallons per minute. Hand engine No. 5, of this city, same makers—horizontal steam cylinder, 7 inches diameter by 8½ stroke; capacity of pump, 220 gallons per minute; weight, 4,443 lbs.; with one gage of water in boiler and no water tank. *Mechanics' Own*, same makers; same size cylinder and pump; weight, 4,278½ lbs.; water in boiler; no tank. Steamer *Southwark*, Philadelphia (this engine played last), same makers—horizontal steam cylinder, 9 in. diameter by 8½ in. stroke; capacity of pump, 600 gallons per minute. Amoskeag Manufacturing Company, Manchester, N.H.—Hand engine No. 2, weight, 4,858½ lbs.; size of steam cylinder (vertical), 8 in. diameter by 12 in. stroke; size of pump (plunger pattern), 4½ in. diameter by 12 in. stroke; capacity of pump, 251 gallons per minute; no air chamber on pump. Steamer *Huron*, same makers, first-class engine—size of steam cylinders, two direct acting vertical engines, respectively 8 in. diameter by 12 in. stroke; two plunger pumps, 4¾ in. diameter of plunger by 12 in. stroke; weight, without fuel or water, 6,030 lbs.; wood and water, 7,100 lbs.; capacity of pumps collectively, 600 gallons per minute. Silsby, Mynderse & Co., Seneca Falls, N. Y.—One first-class engine, rotary pump and engine (Holly's patent); weight, 6,049 lbs.; air chamber on pump; size of steam cylinders not given; capacity of pump, 600 gallons per minute.

These are all that were entered by prominent manufacturers; others were expected, but failed to arrive. We must not omit, however, to notice one machine entered for competition, which will certainly, if it grows a little, create a great revolution; this is the handiwork of Charles Fichtel, of Philadelphia. Size of steamer built by Charles Fichtel, horizontal steam cylinder, 4-8ths of inch diameter by 6-8ths of an inch stroke; capacity of pump, one nut-shell. This was really the neatest specimen of workmanship we have seen for some time. The whole affair weighed but 2½ pounds, and was an exact *fac-simile* of the Lee-Larned engine, even to the Worthington pump which supplied (?) the boilers with water, whose cylinder was only ⅛th of an inch in

diameter. The whole feed pump, steam and water cylinder would easily go into a small thimble. This is a working model, as we saw it in operation, throwing a stream about the size of a pin 4 feet 6 inches. Mr. Fichtel may congratulate himself on having produced the most complete specimen of skill and patience that has been seen in a long time.

The results of the playing of the engines are given below. The time given may not accord with that of the judges (owing to the difference in watches) in relation to the start, but the mean time of playing and the results—both steam and water—are derived from official sources, and is the only authentic account published.

Steamer No. 5, *City of New York*.—Lee & Larned machine.—Signal to make ready given, at 10 o'clock 25 minutes, 50 seconds; signal to start fire given at 10 o'clock, 40 minutes, 50 seconds. Engine began to work in 7 minutes 52 seconds from signal; water from pipe almost instantaneous; water in boiler perfectly cold; no fluid, grease, or anything foreign in the boiler; the average of the steam taken every five minutes was at the start 3 pounds, in 10 minutes 45 pounds—subsequently ranging from 154 to 40 lbs., on the fourth 5 minutes, this result arose from over-firing; in five minutes after, the steam ran quickly up again until they stopped with 135 lbs.; this boiler steamed perfectly free, the fuel being coal. The results obtained through 50 feet of Boyd's hose, out of 1⅛ in. nozzle, were 209 feet; for the first 6 minutes the wind was rather fresh, and blew the stream about some—last 4 minutes no wind whatever; auxiliary feed pump on boiler. On quantity, same engine, through 800 feet of hose; signal to start at 11.25; steam at start, 140 pounds; fuel, wood and coal; pumped 15 minutes on the tank, whose capacity was 2,459 gallons to a foot, size of tank 15 by 22 feet; stopped playing at 11.40, and lowered water in tank 1 foot and 20-100 of a foot.

Steamer *Mechanics' Own*—Third class engine.—Trial on distance, 50 feet of hose, 1⅛ inch nozzle; started at 12.01, stopped at 12.31, having thrown 174 feet against a good cross breeze. This engine did not commence playing until 11 minutes from signal; cause, some obstructions in the smoke pipe unavoidably overlooked; the steam subsequently ranged from 8, 9, 12, 55, 140, 100, 105 lbs.; fuel, wood. Same engine pumping on tank, 800 feet of hose, open butt. Started at 12.38; pumped in 15 minutes 1 foot and 26-100 of a foot from tank 15 by 22 feet; steam ranging from 150 lbs. at the start to 135 lbs. at the close; fuel, wood and coal.

The next engine was *No. 2 Amoskeag*—Second class—L. H. Straw, agent; engine described previously. Started at 1.11; water from pipe in 7.30 from application of torch; no wind at all during trial; played 30 minutes through 1⅛ in. nozzle 160 feet 3 inches; water gage indicated 50 pounds per square inch; last minute 100 lbs.; the steam ranged from 20 lbs. at the start to 75 lbs. on the last stretch; but the average was very poor indeed, owing to an inferior quality of coal, imported from Liverpool; the mean pressure during this trial was 51 pounds. This was a single plunger pump engine. Same engine on quantity—Started at 1.55; water pressure on hose, 140 pounds; steam at the start 135, ranging to 65 lbs. at stopping; quantity exhausted from tank, 1 foot 53-100 of a foot. The steam was better during this trial, but there seemed to be a lack of fire-surface for continued playing.

Next engine—Silsby, Mynderse & Co.—One first-class machine. Started at 2.34; steam in six minutes from signal; water from pipe in 7 minutes 20 seconds threw an inch and a quarter stream 216 feet; no wind whatever; fuel used, coal. Played 26 minutes and was then ruled out by the judges; cause, joint blowing out of the steam cylinder; this machine stood steadier than any of the others whilst playing. Same engine on tank—Signal given at 3.16, stopped at 3.31, quantity discharged from tank, 1 foot 29-100 of a foot; steam ranged from 90 to 82, 60, 55 lbs. This engine should have pumped 18 in. against time from its class; but it was overlooked by the judges.

Next engine—Steamer *Huron*—First class—Built for the city of Detroit by the Amoskeag Co. Signal to start fire at 3 o'clock 56½ minutes; water from pipe in 6 minutes 30 seconds from signal; no wind during trial; distance thrown through 1⅛ in. nozzle, 228 feet 9 inches; during the last five minutes ran very irregularly; steam ranged 23,40, 85, 125, 130, 150 lbs.—stopped at 90 lbs. On quantity—same engine, pumping 18 inches out of tank against time; 800 feet of hose, open butt; 13.30 seconds.

Next engine—Lee & Larned's self-propeller, *Niagara*. Signal to start at 5 o'clock 11 minutes: water from pipe, 6 minutes 30 seconds, through 1⅛ in. nozzle; distance thrown, 208 feet 8 inches. At this point, after having played 16 minutes, the cast-steel pump shaft, 3¼ inches in diameter, was twisted off, and the engine was ruled out very reluctantly by the judges. Fuel used, wood; steam at starting, 5 pounds, ranging from thence to 120.

Steamer *Southwark*.—Lee & Larned engine. Signal at 5 o'clock 50 minutes, 30 seconds; water from pipe in 6 minutes 47 seconds from signal; whistle blown 6 minutes from signal; started with 10 pounds of steam; distance thrown against a stiff breeze, through 50 feet of hose, and 1⅛ inch nozzle, 172 feet; the darkness prevented us from taking the steam, but the average was not over 75 pounds. Same engine on tank through 800 feet of hose, pumping 18 inches against time, 14 minutes 25 seconds; average steam 80 pounds; 579 gallons per minute discharged from pump. This engine ended the trial.

REMARKS.

It will be seen, by examining the figures, that, thus far, the plunger pump party have the best of it, in distance, and also in quantity; but this must not be taken as evidence of the superiority of one over the other, both parties claiming, from their experience, that their respective pumps are the ones which do the best service. The hand engines of Messrs. Lee & Larned are much smaller than the one of Amoskeag No. 2 pattern, yet their engine pumped within 27-100ths of a foot as much on quantity as the Amoskeag, and beating them by 13.9 inches on distance, out of the same sized nozzle. We cannot discuss this matter at present, as at our time of of going to press, the judge's verdict was not made public. The award will, however, probably be given to the rotary pump of Cary, with Lee & Larned's boiler, as regards distance, and to the Amoskeag on quantity discharged in a given time. The Silsby & Mynderse engine presents many excellent features as regards its arrangement and general construction. The boiler steamed very freely, and seemed to make plenty of vapor for an engine that took a good deal. Their stream, however, was not so solid in its body as those of other exhibitors. The committee propose to offer a premium the next year, of $1,500, for the best steam engine drawn by hand. This is the true way to encourage inventors to step forward and try their several inventions; and we doubt not that it will result in bringing the steam fire-engine system to a degree of perfection not yet attained. Any man who looked upon the friendly strife upon that day in the field, and saw the solid columns of water flying swiftly through the hose, could not but wish that such a stream were turned upon the old hand engines, and they washed away entirely. The number of steamers multiply rapidly, we are happy to say, and each company and city is becoming more and more emulous in so good a cause. May the day soon come when none else shall be used; with every exhaust and every separate impulse of the water, they work out practical victories, and attain to greater results in the public mind than any pen or tongue could effect in a year.

COL. JOHN C. BOYD'S HOSE.

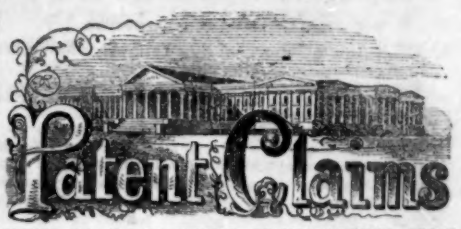
We saw this excellent hose fully tested at the trial of steamers, last Thursday, and can speak of its merits personally. Through all the tremendous strain which the steamers put upon it, even when the *Niagara* accident took place, there was not enough moisture on the outside to soil a handkerchief. It is made of four-ply cotton goods, lined with a composition, and has successfully withstood a pressure of over 360 pounds per square inch.

We desire to return thanks in this place, to Wm. E. Hagan, chairman of the committee, for a place on the judge's stand. It is wholly due to this gentleman's exertions that the affair was pushed forward with the spirit in which we have set forth.

The judges on this occasion were, Daniel Doncaster, L. A. Orcutt and J. P. Collins, Esqs.

The engines upon exhibition have all of them done much better than upon this occasion. It seems at times when the best duty is required, that circumstances will not mold themselves to suit the will.

The time of raising steam varied but 30 seconds in the whole number of engines, with the exception of the *Mechanics' Own*, whose pipe was choked, and we are pleased to be able to record so signal a success in the way of steady playing as these engines accomplished. One half hour of such work with a steamer is a worse test upon it than half-a-day at a fire, on account of the desire of all parties to do their very best, and the rapid rate of working to which the machines are subjected. The accident to the *Niagara* was unavoidable, and could not have been foreseen; we hope it may not be long before we shall have another such trial to record, with better success.



ISSUED FROM THE UNITED STATES PATENT OFFICE
FOR THE WEEK ENDING SEPTEMBER 25, 1860.

[Reported Officially for the SCIENTIFIC AMERICAN.]

*** Pamphlets giving full particulars of the mode of applying for patents, size of model required, and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, New York.

30,109.—Ethan Allen, of Worcester, Mass., for an Improvement in Metallic Cartridges:

I claim constructing a metallic cartridge with a projection or lip, for the reception of the fulminate, substantially in the manner and for the purpose set forth and described.

30,110.—L. L. Alrich, of Carthage, Mo., for an Improvement in Faucets:

I claim the valve plug C, with its key-hole recess, g, and spring, G, in combination with the cylinder, F, and the faucet portions, A a and B, the whole being arranged and operated by a key, in the manner and for the purposes set forth.

[This invention is an improvement in faucets wherein a key is used to open or close the faucet. It consists in operating a plug or valve that is fitted into a cylindrical chamber projecting up from the top of the faucet, so that it may be moved up and down, but which will not turn in the cylinder; said plug being seated in such a manner in the faucet tube and acted upon by a spring that the flow of liquid can only be obtained by using a key adapted to the faucet.]

30,111.—G. B. Arnold, of New York City, for an Improvement in the Manufacture of Ruffles:

I claim, as a new article of manufacture, the ruffle or plaited fabric made as described; that is to say, the fabric to be plaited or ruffled being operated upon so as to be ruffled by the feeding device, and fastened by the stitching apparatus of a sewing machine at one and the same operation, when no binding or foundation fabric is employed.

30,112.—G. B. Arnold and Alfred Arnold, of New York City, for an Improvement in Sewing Machines:

We claim, first, In a sewing machine, the employment of the separator, C, or its equivulent, for the purpose of separating two pieces of cloth, E and F, and thereby protecting F from the action of the gathering mechanism, substantially as set forth.

Second, Gathering cloth and stitching or fastening the gathers on a sewing machine, by the combined action of the single feeding device, A, presser foot, B, and separator, C, or their equivalents, substantially in the manner described.

Third, Regulating the length of the stitches in the production of a gathered fabric, by changing the position of the separator, C or of C, and the presser foot, B, relatively to the forward extremity of the path traversed by the feeder, A, substantially as set forth.

30,113.—J. C. Baldwin, of Waterville, N. Y., M. D. Baldwin, of Brantford, C. W., and Robert Brayton, of Buffalo, N. Y., for an Improvement in Preserving Hops:

We claim the described process of preparing and preserving hops, substantially as set forth.

30,114.—G. S. Ball and Wm. H. Nauman, of Dayton, Ohio, for an Improvement in Seeding Machines:

I claim the arrangement and combination of the feeder, a, the indicator, D, graduated arc, E, slides, B B, and cut-off, F, the whole constructed and operating as set forth.

30,115.—Benj. Barnard, of Farmington, Ohio, for an Improvement in Seeding Machines:

I claim the arrangement of the plates, n h g j, slide, v, scrapers, a', and bars, K L, and rod, M, as and for the purpose shown and described.

[This invention consists in an improved seed-distributing apparatus, the mode of constructing and arranging it, together with gages for regulating the depth of the planting of the seed, and agitators for preventing the choking of the seed in the seed-boxes, the parts being so arranged, whereby an exceedingly simple and efficient machine is obtained for the purpose specified, and one not liable to get out of repair or inoperative by use.]

30,116.—G. E. Beach, of Jersey City, N. J., for an Improved Railroad Switch:

I claim, first, So hinging and connecting two rails, B C, or J K, in in a continuous series that their positions may be shifted, for the purpose of guiding a train upon another track without breaking their continuity, substantially as set forth.

Second, I claim the fixed bearings, m m, in combination with the forked bar or rod, P, and the hinged continuous rails, B C, and J K, substantially as and for the purpose described.

Third, I claim, in combination with the hinged continuous rail, or rails, B C J K, the employment of the tongue or tongues, E G, operating together, substantially as and for the purposes described.

Fourth, I claim, in combination with the hinged continuous rails, B C J K, and tongues, E G, the spring or springs, R T, or their equivalents, arranged substantially as and for the purpose set forth.

30,117.—S. A. Black and F. C. Ford, of Erie, Pa., for a Substitute for Railroad Frog:

We claim the arrangement of the levers and bars set forth, in combination with the piece, c, of the rail, supported upon the chair and operated as described.

30,118—J. H. Boyd, of Baltimore, Md., for an Improvement in Saddles:

I claim the application to the cantle of saddles of an india-rubber roll, as described.

30,119.—T. E. C. Brinly, of Louisville, Ky., for an Improvement in Cultivators:

I claim the combination and arrangement of the plow beam, A, provided with removable feet or standards, D C F, and the two pairs of adjustable rings or arms, H H N N, provided respectively with the shares, J, and teeth, L, as and for the purposes set forth.

[The object of this invention is to combine the plow, harrow and cultivator in such a manner or by such an arrangement of parts that the device may be used in any of the capacities aforesaid by a very simple adjustment, and made to work under any of its adjustments equally as well as those implements intended for any of the above named purposes separately.]

30,120.—J. Card, of Cleveland, Ohio, for an Improved Carriage Jack:

I claim the special arrangement of the wheel, A, lever, E, and foot piece, D, operating as and for the purpose set forth.

30,121.—Alfred Carson, of New York City, for an Improved Stench Trap for Sinks:

I claim the arrangement of the chamber, B, plate, a, partition, a, screen, d, and pipe, C, with the basin, A, in the manner and for the purposes shown and described.

[The object of this invention is to construct and arrange the parts compressing the stench trap, and apply them in such a way that the trap will be equally as efficient as those ordinarily used, and at the same time be perfectly accessible, so that in case the trap or eduction pipe become choked or clogged they may be readily cleaned and put in proper order by any person of ordinary ability, no mechanic or artisan being required, as is the case with the ordinary traps; the latter being below the article to which they are applied, and altogether inaccessible except the pipe enclosing the same be cut, an operation attended with considerable trouble and expense.]

30,122.—Wm. Cleveland, of Orange, N. J. for an Improvement in Faucets:

I claim, in combination with the body and top of a faucet, one of which is packed with suitable flexible material, the elastic washer, e, for the purpose and substantially in the manner described.

I also claim the recesses, m m, in the inside of the body of the faucet, to allow the packing to swell or distend into, and thus prevent it from being injured or misplaced by the turning of the tap, substantially as described.

I also claim, in combination with the packing, the ribs or projections, o, that embed themselves therein, to prevent said packing from slipping, substantially as described,

30,123.—J. W. Cochran, of New York City, for an Improvement in Projectiles:

I claim, first, The construction of projectiles with corrugations or hollow beads, a a b b, made and applied substantially as set forth and described, so that the force of the explosion of the charge will cause said corrugations to be expanded laterally, as and for the purpose set forth and described.

Second, The mode of providing for the lubrication of the gun by the perforations, n n, in the beads, fillets, or corrugations of the cap or other portion of the projectile.

Third, Placing the missiles or substance to be scattered by the explosion of a hollow projectile within a cylindrical casing, D, fitted to the interior of the projectile, substantially as and for the purpose described.

Fourth, The employment of the cap, C, or its equivalent, with the cylinder, A, as and for the purposes set forth and described.

Fifth, The arrangement of the tube, F, nipple, g, plunger, G, and spring, H, in combination with the powder cylinder, E, substantially as described.

30,124.—Patrick Cody, of Hamilton, N. Y., for an Improved Clothes' Frame:

I claim the connecting of the inner ends of the arm, E, of a folding clothes frame by bevel or miter gears, C, substantially as set forth.

[This invention relates to an improvement in that class of clothes-drying frames, in which folding arms are employed. The invention consists in connecting the inner ends of the arms together by gears, and using in connection therewith retaining pawls, whereby the arms may be readily and compactly folded when not designed for use, and also readily adjusted in proper position to receive the clothes when required.]

30,125.—G. W. Cunningham, of Paris, Mo;, for an Improvement in Plows:

I claim the arrangement in a plow of a moldboard, I G J, open at a a a a, coulter, H, sharp edges, M L, furrow side, E, handles, D C, and bearer, A, as and for the purposes described.

30,126.—P. Davy, of Portsmouth, Ohio, for an Improvement in Iron Ties for Cotton Bales:

I claim the manner described of fastening the ends of an iron tie, by means of the elevations, a', fitting into the corresponding depressions, a, when used in connection with a keeper, B, or its equivalent, all substantially as and for the purpose specified.

30,127.—A. G. Davis and H. S. Frost of Watertown, Conn., for an Improvement in Parasols:

We claim the combination and arrangement of the duplex spring catch, E, and the two slots, d e, with the tubular slide, b, and the reception tube, D, of the folding joint, C, of a parasol stick, the whole being to operate in manner as specified.

30,128.—P. S. Devlan, of Elizabethport, N. J., for an Improvement in Journal Boxes:

I claim the employment of paper pulp to form boxes for bearings of journals of shafts and axles, substantially as before described.

30,129.—David Eldred, of Monmouth, Ill., for an Improvement in Seeding Machines:

I claim the arrangement of the cutters, M, guards, K, and adjustable bars, J, with the variable cells, c c, covers, I, seed boxes, E E, elastic plate, l, pole, N, and frame, A, as and for the purposes shown and described,

[This invention consists in the employment of certain parts, so arranged and disposed as to possess many advantages, and render the machine exceedingly efficient in its operation.]

30,130.—Wm. Dougherty, of Philadelphia, Pa., for an Improved Saw-grinding Machine:

I claim, first, The reciprocating frame, Q, and the frames, R and S, connected together and arranged substantially as set forth, in combination with the revolving grind-stone.

Second, The frame, R, hung to the reciprocating frame, Q, substantially in the manner described, in combination with the arm, q, and the adjustable slotted bar, U, the whole being arranged and operating substantially as and for the purpose set forth.

Third, The frame, S, its rib, w, and the stationary arm, V, or its equivalent, in combination with the reciprocating frame, for the purpose specified.

Fourth, The yielding plate, T T, with their rollers, p p, when arranged in respect to the frame, substantially as and for the purpose set forth.

30,131.—Silas Dodson, of San Francisco, Cal., for an Improvement in Machines for Cleaning Rice:

I claim, first, The blocks, G G, composed entirely of stone, forming a vertical hollow cylinder with uninterrupted inner surface, when the said blocks are arranged and combined with the drum, J, and its sheepskin strips, as and for the purpose set forth.

Secondly, The drags or scrapers, n n, hung loosely to the drum within the folds of the sheepskin strips, and arranged in respect to the stone cylinder, as specified, in combination with the sheepskin strips, arranged as described.

30,132.—C. J. Fay, of Hammonton, N. J., for an Improvement in Hay Rakes:

I claim, first, The revolving cylinder, E, provided with the self-adjusting teeth, i, arranged substantially as and for the purpose set forth.

Second, The combination of the revolving toothed cylinder, E, guides, G, and intermittingly rotating crib reel formed of the shaft, n, and rods, o, as and for the purposes specified.

[This invention consists in employing a rotating cylinder provided with movable or adjustable teeth, and using in connection with the same elastic guides and an intermittingly rotating crib reel for effecting the desired end.]

30,133.—R. W. Fenwick, of Washington, D. C., for an Improvement in Metallic Bands for Cotton Bales:

I claim the fastening, substantially as described, for metallic bands for cotton bales.

30,134.—E. C. Ford, of New York City, for an Improved Apparatus for Opening and Closing Hatchways:

I claim opening and closing hatchways automatically by means of a revolving screw and cams, or their equivalents, such cams and screw having a relative motion to the hoisting gear and to the ascent and descent of the load, and which are so arranged and connected with the hatches that each of them, respectively, shall thereby open at the passing of the load and close again after its passage, substantially as set forth.

30,135.—H. H. Foye, of Ottawa, Ill., for an Improvement in Harvesters:

I claim the arrangement of the reel post, P and Q, with respect to the main frame draught bar, J, and the cutting apparatus, substantially in the manner described and for the purpose specified.

30,136.—E. J. Fraser, of Kansas City, Mo., for an Improvement in Plows:

I claim connecting the plow beam, K, to the bar, G, through the medium of the pendent bar, I, provided with the slide, l, and bolt, k, in connection with the clip, J, attached to the plow beam, K, and provided with the slot, l, substantially as described.

[This invention relates to certain improvements in that class of plows which are connected with wheels, and are frequently termed sulkey plows, and possesses several advantages over others hitherto devised.]

30,137.—Henry Franz, of Philadelphia, Pa., for an Improvement in Floors for Malt Kilns;

I claim the wire rail plate described, the same being constructed substantially as described and for the purpose specified.

30,138.—George Frost, of Brooklyn, N. Y., for an Improvement in Cut-off Valves for Steam Engines:

I claim, first, The opening of the balance poppet valve, D, by its valve rod, E, coming in contact with the adjustable stop, F, through the movement of the box slide valve, A.

Second, The retaining of the balance poppet valve, D, after it is opened by the catch, K or its equivalent, until the proper period for tripping it again occurs.

Third, Tripping the catch, K, by the pins, L, on the sliding bars, M, they being in connection with the governor.

Fourth, The opening of the balance poppet valve, D, the reverse way, by means of a lever, W, in the manner as described and set forth, through the movement of the box slide valve, A.

Fifth, The closing of the balance poppet valve, D, by a small cylinder and piston, Y, having steam continually impinging on its piston when the catch, K, is disengaged, which cylinder and piston, Y, can be arranged in any required position, the whole being combined, arranged and operating substantially as described and set forth.

30,139.—J. L. Garlington, of Snapping Shoals, Ga., for an Improvement in Sowing Machines:

I claim the vibrating hopper, D, in connection with the fixed bag, F, and stationary standard, H, provided either with the rod, l, with arms, m, attached, or provided with the supplemental bag, n, as and for the purpose as set forth.

[The object of this invention is to obtain a simple and efficient machine for planting all kinds of seed, and also for sowing pulverulent manures. There are some kinds of seeds extremely difficult to plant with machines, such, for instance, as cotton seed, beet seed, &c., and also seeds which are naturally smooth, but are rendered adhesive by being rolled in moistened pulverulent manures previous to planting.]

30,140.—J. L. Hall, of Cincinnati, Ohio, for an Improvement in Locks:

I claim, first, The peculiar construction of the bolt, D, and its arrangement with reference to the other parts of the lock, whereby the whole mechanism is inclosed within and protected by the bolt.

Second, I claim the combination with the tumblers, 1 2, &c., of the central plate or disk, F, as constructed, the same being made to operate in connection with the central stem, H, in the manner as and for the purposes specified.

Third, I claim making the tumbler, 2, with an internal sectoral enlargement, z, for the purpose of affording space, u, for the guard plate, J, without destroying the continuity of metal composing the tumbler.

Fourth, I claim the conical key blocks, I I', constructed substantially as described, and inserted into the door plate with reference to the stems, G and H, for the purpose of operating a combination lock from without by means of a key, in the manner specified.

Fifth, I claim the peculiar construction and adaptation of the stems, G H, so that the relative position of the same, with reference to their corresponding key blocks, I I', may be varied in the manner and for the purpose specified.

Sixth, I claim the combined arrangement of the internal enlargement, y, upon the tumbler, 4, the pin, w, upon the outer surface of the same, and the corresponding pin upon the under surface of disk, F, and the ring, K, upon the stem, H, for the purpose of rendering the combinations of the lock, and particularly the changes thereof, more obscure and intricate, as described.

Seventh, I claim the manner of changing the combinations without the necessity of removing the lock for that purpose, by allowing the stem, H, to be withdrawn from the inside of the lock and replaced in the contemplated new position, in the manner substantially as described.

Eighth, I claim the key, 12, and the portable index plate, 13, in combination, the former constructed with a part, x, fitted to and entering an aperture in the index plate in various positions, and forming therewith an element in the combination of the lock.

30,141.—Jacob Haller, of Ann Arbor, Mich., for an Improved Electro-magnetic Burglar Alarm:

I claim, first, The arrangement of a series of ropes or chains, B, extending over pulleys, a b, in combination with the double armed levers, c d, rockshaft, E, and alarm, F, or its equivalent, constructed and operating substantially in the manner and for the purpose specified.

Second, The arrangement of the pin, p2, on the hammer, t, of the alarm, in combination with a self-lighter, H, substantially as described, so that, by the action of the hammer itself, the light is struck.

Third, The arrangement of the circuit breakers, r and w, and their connecting wires, in combination with the armature, n, of the electro-magnet, and with the hammer, t, and bell, u, constructed and operated substantially in the manner and for the purpose set forth.

Fourth, The arrangement of the spring frame, G, in combination with the electro-magnetic alarm, F, constructed and operating substantially as and for the purpose specified.

[A full description and engraving o this invention will appear in an early number of the SCIENTIFIC AMERICAN.]

30,142.—Zebulon Hunt, of Hudson, N. Y., for an Improvement in Cooking Stoves:

I claim placing the brides or brace, B, or any similar device, within the ventilated chamber, A, substantially in the manner and for the purpose set forth.

30,143.—John Jacobs, of Columbus, Ohio, for an Improvement in Beehives:

I claim, first, The arrangement of the posts, A, joists, B, top and bottom longitudinal strips, b b', adjustable notched cross pieces, c c', detachable shouldered cross pieces, e e, detachable longitudinal central strips, d, and sectional bottomless hives, g g' g'', when the whole is constructed and operated in the manner and for the purposes described.

Second, In combination with the above, the wire gauze ventilating valve, s, when said valve is constructed and arranged in the manner and for the purpose described.

[This invention consists of narrow frames for supporting a series of beehives above the ground. The hives are made in horizontal sections and have no buttons, but are provided with a wire gauze, which ventilates the whole series of sections. The frame is so constructed that any one of the hives can be removed without disturbing those adjoining it. We regard this a capital arrangement, as it will prevent the destruction of the bees by frost and afford great convenience in handling the hive.]

30,144.—G. W. Kersey and J. J. Kersey, of Beartown, Pa., for an Improvement in Potato Planters:

I claim the rotating disk, F, armed with hooks, a, in connection with the hopper, G, and rotating brushwheel, H, the above parts being placed on a mounted frame, A, and arranged relatively with each other, to operate as and for the purpose set forth.

[This invention consists in the employment or use of a rotary disk armed with hooks at its periphery, which pass through a slot in a hopper, and using, in connection with said disk, a rotary stripping brush, the above parts being placed on a mounted frame, and so arranged in relation with each other that, as the machine is drawn along, the hooks on the rotating disk will take the potatoes from the hopper while the stripping brush will disengage them from the hooks at the proper point, so that they may drop in the furrow or drill.]

30,145.—Charles Kingler, of New York City, for an Improved Sugar-cutting Machine:

I claim the arrangement of the plates, A and B, made to move towards and from each other, and provided with knives running parallel to each other, and attached perpendicular on the faces of said plates, directly opposite each other, in combination with two rollers, H and H', provided with knives, m m', running horizontally across the surfaces of said rollers, and so combining said rollers that, in operation, these horizontal knives will act simultaneously on each side of the slabs or pieces of sugar, the whole being arranged and combined in the manner substantially as described.

30,146.—W. H. Livingston, of New York City, for an Improvement in Fastening Axes to Handles:

I claim the arrangement of the wedges, D D', cap, E, and screw, F, with the strap, C, helve, B, and ax, A, as and for the purposes shown and described.

[The object of this invention is to attach the implement to the handle in such a way that it may be readily detached when necessary, and also readily secured thereto and a firm connection obtained; the invention admitting of the implement being adjusted on its handle by any person of ordinary ability, and with the aid only of a simple wrench. The ordinary mode of attaching axes, and similar tools, to their handles; to wit, by wedging the end of the handle in the eye it forms a very insecure connection, for, on the least shrinking of the wood, the handle becomes loose and is liable to fly off when the implement is used; besides, the old mode does not admit of the handle being readily removed from the implement in case a new handle is required, nor can the handle, in case of its becoming loose in the eye, be tightened with facility. By this invention, it is believed that these difficulties are obviated.]

30,147.—Ferdinand Luedke, of New York City, for an Improvement in Factitious Beer:

I claim the combination of sugar, red wine, gum arabic, bi-carbonate of soda and tartaric acid, in the manner and for the purpose set forth.

30,148.—Franklin Maynard, of Cambridge, Mass., for an Improvement in Shoe Lasts:

I claim providing that part of the last on which the pegging is performed with any substance or material of a plastic nature, or which can be re-solidified and re-surfaced for continued use without removal from the body of the last, and be pegged into without abrasion or destruction, in the same or any equivalent manner set forth and described.

30,149.—Charles Messenger, of Warren, Ohio, for an Improved Chair for Invalids:

I claim the seat, A, movable piece, A', support, W, and button, G, when these parts are constructed, arranged, combined and operated as set forth.

I also claim the lids, M N, slides, R, cord, S', pulley, L', and ring, O', when these parts are constructed, arranged and operated as specified.

30,150.—James Millholland, of Reading, Pa., for an Improvement in Slide Valves:

I claim, first, The cap, C, with its annular flanges, f and e, and the spiral spring, D, or its equivalent, when the flange, e, is so adapted to the hub, c, of the valve, that the said hub shall resist all lateral strains imparted to the cap, and when the whole is applied and arranged in respect to the valve, substantially as specified.

Second, I claim the described application of one or more severed metallic rings, i i, fitted into grooves in the annular flange, d, of the valve, and bearing against the annular flange, f, of the cap, as and for the purpose set forth.

Third, I claim beveling the upper sides of the annular recesses, h h, so as to present a sharp edge, for the purpose specified.

30,151.—J. B. Murray, of New York City, for an Improved Prepaid Envelope:

I claim, first, A prepared postage stamp, of suitable size and form, for a postal wrapper for newspapers, periodicals, &c., substantially as described, and in contradistinction to the letter envelope stamp and the small stamp in common use.

Second, I claim, in connection with the wrapper stamp, parallel superscription lines, substantially as described.

Third, I claim, in combination with the wrapper stamp, a marginal coating of gum arabic, or other adhesive material, substantially as described.

Fourth, I claim a prepaid postage stamp, which is also a ruled and self-sealing newspaper wrapper, substantially as described.

30,152.—W. T. Nicholson, of Providence, R. I., and T. Earle, of Smithfield, R. I., for an Improved Egg-beater:

We claim the arrangement of the propeller blades, G G, in combination with the wire frame, I I, substantially as described, for the purposes specified.

30,153.—Isaac Pelham, of Ithaca, N. Y., for an Improved Method of Attaching Handles to Cross-cut Saws:

I claim the rods, C E, fitted in the handle, A, and provided with the screw nuts, D E, and slotted parts, d, the latter being fitted on the saw, and having their ends in notches, e e, therein, the ends of the saw being fitted in the bent notched ends, h h, of the plate, g, essentially as and for the purpose set forth.

30,154.—Ira Perego, Jr., of New York City, for an Improvement in Shirt Bosoms:

I claim a shirt bosom, made with stiffening strips of the same or other material as the bosom, applied substantially as and for the purposes set forth.

[This invention consists in the insertion of one or more strips of linen, cotton, or other suitable material, in the plaits of the bosom, which strips extend down from the collar band of the shirt to about

one-third of the length of the bosom, more or less, and are stitched to the plaits in stitching their edges, thus, when the bosom is starched and ironed, it will possess greater stiffness, as far as the strips extend, than the double ply of the plaits, and that portion of the bosom below the inserted strips being more flexible than that above it, it will "break" and have the effect of keeping the upper portion stiff and "unbroken" for a considerable length of time.]

30,155.—J. M. Robb, of Charleston, S. C., for an Improved Railroad Frog:

I claim the combination of the rods, C C' B B', and the curved chilled ridge, D1 D2 D2, when the chilled curved ridge has projections, b' b', formed on it, and the bottom flanges of the rails has recesses, a' a', cut in them, substantially as and for the purposes described.

30,156.—Wm. Ralph, of Holland Patent, N. Y., for an Improvement in Cheese Vats:

I claim, first, The employment or use of a stove or heater, B, fitted within a jacket, b, and applied to the water chamber, A, of a cheese vat, substantially as and for the purpose set forth.

Second, In combination with a stove or heater, B, thus applied to the water chamber, A, the oblique strips, d, attached to the bottom of said water chamber, for the purpose specified.

Third, The warm water reserve-chamber and refrigerator, E, applied to the vat, and arranged substantially as shown, to be used jointly either within the stove or heater, B, and water chamber, A, as occasion may require, for the purpose specified.

[This invention has for its object the subjecting of the milk in the inner vat to an equal or uniform heat, so that the whole mass will be quickly brought to the desired temperature favorable for coagulation. The invention also has for its object a ready means for re-supplying, for a second coagulating process of the milk, the water chamber or the water space between the inner and outer vats with warm water after the withdrawing of the previously heated water and the substitution of cold water, for the purpose of cooling or settling the curd; said means also furnishing a supply of properly heated water for the proper cleansing of various articles pertaining to cheese-making. The invention has further for its object the keeping of the milk at a proper low temperature, to preserve the same in suitable condition a convenient length of time in warm weather.]

30,157.—P. H. Roots, of Connersville, Ind., for an Improvement in Blowers:

I claim the combination of the pistons, D D, and recesses, E E, when so constructed as to present but four essential points of positive contact, as described, and for the purposes set forth.

30,158.—W. G. Savage, of Clinton, Ill., for an Improvement in Corn Planters:

I claim the arrangement of the slides, c c, boxes, B, levers, d d, slide, E, adjustable seat, G, seat, C, axle, H, pole, J, and lever, K, all as shown and described for the purposes set forth.

[This invention relates to an improvement in that class of corn planters which have their seed-distributing devices operated manually, the operator sitting on the machine.]

30,159.—C. S. Schmidt, of New York City, for an Improved Mop Wringer:

I claim combining with the board, A, having a slot, C, cut in it, as described, the pivoted arm, E, and arm, F; the same being arranged and operating as and for the purposes set forth.

[This invention is to be applied to a tub or pail which is used with a mop for washing and scrubbing purposes, for clamping and holding the end of the mop while it can be wrung out. The invention consists in the use of a semi-circular board with a slot cut in it sufficiently large to receive the mop, which board is furnished with cleets that will prevent it from slipping off the tub or pail on which it is placed for use, in combination with a fixed and a movable clamping arm, between which arms the end of the mop is held while the water is wrung out of it.]

30,160.—Wm. J. Scott. of Albany, N. Y., for an Improved Lock for Burglar-proof Pockets, &c.:

I claim the method of constructing a lock of two plates of metal, held together, when locked, by spring head bolts attached to one of the plates passing through suitable apertures made in the other plate, together with the key for separating the plates, substantially for the purpose and in the manner set forth in the within specification.

30,161.—Ives Scoville, of Chicago, Ill., for an Improvement in Hemp Brakes:

I claim the arrangement of successive sets of breaking, beating and cleaning rollers running at different speed, and the lower rollers, M' O', having their bearings in a frame, B, vibrating upon the driving shaft, D, in combination with a treadle, I, substantially as and for the purposes set forth.

30,162.—Wm. H. Scoville and Ives Scoville, of Chicago, Ill., for an Improvement in Quartz Pulverizers and Amalgamators:

We claim the arrangement of a double trough, R U, and gutter, Q, in combination with four crushing and driving wheels, B B B B, two grinding rollers, H H, and two breaking rollers, J J; the various parts of the machine being connected and placed in relation to each other substantially as and for the purposes set forth.

30,163.—J. C. Sellers, of Woodville, Miss., for an Improvement in Cotton Cultivators:

I claim the arrangement of a reciprocating spring hoe frame, N N G, and cam grooves, L H, in combination with an independent revolving shaft, E, and with the plowshares, V V, and coverers, U U, of a cotton-thinning plow, substantially as and for the purpose set forth.

30,164.—Kirby Spencer, of Minneapolis, Ind., for an Improved Refrigerator:

I claim the apartments, f, in combination with the ventilating apertures g, the aperture, x, the sliding covers, j, the ventilating flue, K, the pipe, L, the refrigerating chamber, x', the apertures, h, and the aperture, I, constructed substantially in the manner specified and operating together for the purposes above described.

30,165.—Thomas Spencer, of Syracuse, N. Y., for an Improvement in the Manufacture of Common Salt:

I claim the admixture with common salt, after crystallization, of sulphate of soda, or its equivalent, as and for the purposes set forth.

30,166.—T. T. Strode, of Mortonville, Pa., for an Improved Calender Clock:

I claim, first, The arrangement and combination of the year wheel, C, with the grooves, n n' n*, and o o' o*, or their equivalents, the month wheel, D, the levers, h i, and b c, the pins, m and e, and the pawls, l and f, constructed and operating substantially in the manner and for the purpose described.

Second, The arrangement of the grooves, n n' n*, pin, e, and pawl, f, substantially as set forth, for the purpose of controlling the motion of the month wheel according to the variations in the lengths of the months.

Third, The arrangement of the grooves, o o' o*, pin, m, and pawl, l, substantially as specified, for the purpose of controlling the motion of the year wheel.

Fourth, The manner in which the names of the months are arranged on the face of the year wheel, viz: marking the name of each long month once, and the name of each short month twice, in two consecutive spaces, as and for the purpose set forth.

Fifth, The employment of the year wheel, C, constructed substantially as specified, for the purpose of controlling its own motion and that of the month wheel, D.

30,167.—W. S. Stetson, of Baltimore, Md., for an Improvement in Reaping Machines:

I claim the improved implement for harvesters, the same consisting of the combination of a rake and fork substantially in the manner and for the purposes set forth.

30,168.—S. E. Tompkins, of Newark, N. J., for an Improvement in Saddle Trees:

I claim, first, A metal frame, A, for saddle trees, when said frame is cast with depressions, s s, flanches, e e, and holes, f f, in the manner and for the purposes described.

Second, The use of a piece of leather, D, of a form and size corresponding to the underside of the seat, B, in combination with a frame, A, which is constructed with depressions, s s, flanches, e e, and holes, f f, in the manner described.

Third, The combination of the rear shoulder, n', of the hook, H, with the jog, n, of the tree, in the manner and for the purpose described.

Fourth, The combination of the projections, h h, of the tree with the shoulders or sockets, j j, in the underside of the seat, in the manner and for the purpose described.

30,169.—John Underwood, of Cameron, Ill., for an Improvement in Corn Planters:

I claim the relative arrangement and combination of the adjusting wheels, H H, wirh their frames, supporting and marking wheels, B B, pitman, C C, dropping wheels, a a, and opening wheels, E E, operating as and for the purposes set forth.

30,170.—Walter Warren, of Penn Yan, N. Y., for an Improvement in Plows:

I claim the arrangement of the beam, A, when made from its forward part to near its union with the mold board as described, with the standard, E, of the fore plow, D, and mold board, B, as specified, for the purposes set forth.

30,171.—James White, of Cleveland, Ohio, for an Improvement in Smut and Scouring Machines:

I claim, first, The frame, F, springs, L, perforated adjustable plate, E, wire screen, I, and plate, K; the several parts being arranged and operated as described.

Second, I claim the adjustable beaters, T, constructed, arranged and operated substantially as and for the purpose specified.

30,172.—J. G. Whitwell, of New York City, for an Improved Curtain Fixture:

I claim the arrangement of spiral springs, d d, between the divided half circles, a a, of a roller end, which, by expanding, holds a cord or band against a circular surface, f, as described, substantially as and for the pupose specified.

30,173.—J. F. Wood, of Houma, La., for an Improvement in Cultivators:

I claim the arrangement of the hinged adjustable wings, E, when used in combination with the adjustable frame, A, shovels, D, and rakes, C, substantially in the manner and for the purpose set forth.

[This cultivator is intended for cultivating sugar cane, corn, &c., and it is designed to straddle one row and to work both sides of the plant at once; or it may also be used for planting corn or cotton, by attaching to it a pressing roller, and, thus arranged, it will cover the seed to any desired depth.]

30,174.—Joseph Worcester, of Newport, Ky., for an Improved Annealing Apparatus:

I claim the dwarf sleeper walls, e e, in the annealing furnace, A, affording a bed for the annealing box, B, when used in combination with the carriage, C, or any similar carriage for raising or lowering its load; all substantially arranged as described and for the purpose set forth.

30,175.—A. S. Ballard (assignor to himself and R. J. Robeson), of Mount Pleasant, Ind., for an Improvement in Earth Borers for Post Holes:

I claim the manufacture of earth borers in separate parts, all arranged and operating substantially as and for the purposes set forth.

30,176.—George Burnham (assignor to himself W. D. Rinehart and C. A. Nauman), of Pittsburgh, Pa., for an Improvement in Oscillating Valves for Steam Engines:

I claim so constructing the plug and seat of cylindrical or conical valves, substantially as described, as that the live steam from the boiler will press on both sides of the valve plug, while the exhaust steam will pass through a central cavity in the plug, for the purpose of equalizing the pressure of the steam on the plug, so as to prevent the valve wearing unevenly and to reduce the friction of the plug inside the valve seat.

30,177.—H. W. Collender (assignor to himself and Michael Phelan), of New York City, for an Improvement in Cushions for Billiard Tables:

I claim making cushions for billiard tables of two thicknesses of what is known as the soft compound of vulcanized india-rubber, or allied gum, with an interposed thickness of what is known as the hard compound of vulcanized india-rubber, or allied gum, or, as the equivalent thereof, with an interposed thickness of the soft compound of vulcanized india-rubber, or allied gum, rendered hard by the admixture of fibrous or equivalent substance, substantially as and for the purpose specified.

30,178.—S. F. Gelston and J. T. Johnson, of Buffalo, N. Y., and C. R. Tompkins, of Rochester, N. Y., assignors to S. F. Gelston and J. T. Johnson, aforesaid, for an Improvement in Stave Machines:

We claim the method of adjusting the machine to operate on staves of different lengths by means of the index driving wheel, N, in combination with the rib, b, substantially as described.

30,179.—John Lyker (assignor to himself and J. I. Brown), of Argosville, N. Y., for an Improvement in Combined Roller and Manure Spreader:

I claim the arrangement of the rollers, B B, with the frame, A, gear wheels, f g, connecting rod, E, hopper, D, pendant, c, and slide, b, all as shown and described for the purposes set forth.

[This invention consists in the employment of a box or hopper placed on a suitable frame which is mounted on rollers, and provided with a reciprocating, perforated slide operated from one of the rollers; all being so arranged that the ground may be rolled, and guano, ashes, lime, plaster or other fine, pulverulent fertilizer sowed at the same time.]

30,180.—Antonio Meucci, assignor to the New York Paraffine Candle Company, of Richmond county, N. Y., for an Improvement in Apparatus for Molding Candles:

I claim the combination of die and candle guide substantially as described, for the purpose of finishing candles.

I also claim the combination of an elastic strap with the receiving bed, for the purpose of holding the candle in contact therewith.

I also claim the combination of die, candle guide, K, and candle receiving bed, substantially in the manner and for the purpose described.

30,181.—D. D. Parmelee, of Salem, Mass., assignor to the Beverly Rubber Company, assignors to J. H. Cheever, of New York City, for an Improvement in Restoring Waste Vulcanized Rubber:

I claim the process herein described of rendering waste vulcanized, "hermized" or "changed" india-rubber useful and capable of being re-worked, for the manufacture of articles of trade and commerce, by reducing said rubber to a fine or powdered state, and then combining with the same india-rubber which has been modified by heat, so as to obtain it either in a semi-liquid or melted condition, or in a liquid or vaporous condition, i. e., in the form of its products of distillation, substantially in the manner and modes herein set forth.

30,182.—J. W. Parnell (assignor to James Morrison, Jr.), of Troy, N. Y., for an Improved Stove Grate,

I claim an improved fire grate for stoves, consisting of the frame (A), the separate and parallel grate bars (B), and the rocker (E), constructed and arranged as herein described and set forth.

30,183.—H. W. Putney, of Lyons, N. Y., assignor to himself and C. C. Crane, of Penn Yan, N. Y., for for an Improvement in Sieves for Separating Grain, &c.:

I claim the arrangement of the distributing board, C, the conducting board, D, and auxiliary sieve, F, when applied to the frame, A, and guage, B, in the manner and for the purpose specified.

30,184.—John Randall, of Elmira, N. Y., assignor to himself and R. R. Smalley, of Troy, N. Y., for an Improvement in Slide Valve:

I claim the employment, in combination with the valve, constructed with a single opening, b, right through it, of the induction cavity, b, in the seat, the plate, E, and set screws, F F, applied to the back of the valve, and a valve chest, in constant communication with the eduction pipe, the whole arranged and operating substantially as herein set forth.

[This invention consists in certain means whereby the valve is relieved of all pressure toward its seat, and is made to work with a very inconsiderable amount of friction.]

30,185.—J. C. Richards (assignor to himself, J. Hubbbler and R. M. McGrath), of Lafayette, Ind., for an Improvement in Corn Shellers and Cleaners:

I claim, first, The cylinder, k, made up of rods and arranged in relation to the revolving screen, and operated as herein set forth.

Second, The arrangement of the toothed cylinder, i, within the rod cylinder, k, and revolving screen cylinder, n, with the hopper at the one end and the cob chute at the other end—the corn being delivered through the rod cylinder to the screen, the cobs being conveyed to the chute by the helical arrangement of the teeth, as described.

Third, The revolving screen or cleaner, n, in combination with a sheller composed of the toothed cylinder and rod cylinder or its equivalent, said cleaner rotating around the whole length of the sheller, and the entire surface of both sheller and cleaner being operative surfaces, as set forth.

30,186.—J. J. Walsh (assignor to himself, T. L. Braynard and H. C. Adams), of New York City, for an Improvement in Gun Carriage:

I claim the use and arrangement of the hand wheel, D, and gear wheel, B, in combination with the supporting and pivot wheel, A, substantially as described, for the purpose of running out and in and training cannon as described.

I also claim the arrangement of the said wheels, D and B, in combination with the geared sector, J, for the purpose of elevating or depressing the gun as described.

I also claim the arrangement of the rods, L, links, h h, and levers, k, k, in combination with the two carriages substantially as described, for the purpose of lessening the extent and force of the recoil of the gun.

I also claim the arrangement and combination of the screw, 1 2, and the pivot wheel, A, substantially as described, for the purpose of elevating and lowering the gun carriage, for the purposes set forth.

30,187.—F. H. West, of San Francisco, Cal., assignor to T. S. Seabury, of Stony Brook, N. Y., for an Improved Compass Protractor:

I claim the combination with ordinary parallel rulers, A, of a movable circle, B, graduated as a compass and provided with a semi-circular central opening, b, with the exact center of the circle marked therein, substantially in the manner and for the purposes herein set forth.

30,188.—W. T. Zollickoffer (assignor to himself and W. Brown), of Shelbyville, Tenn., for an Improvement in Plows:

I claim the arrangement of the curved bar, C, foot, D, and beam, A, with the serrated bar, E, slotted clevis, F, pawls, e e, and hooks, d' d', all in the manner and for the purposes herein shown and described.

[This invention relates to certain improvements in that class of plows which are more especially designed for the cultivation of crops, such as cotton, corn, and other crops which are grown in hills and drills. The invention consists in the employment or use of a reversable standard, so constructed and arranged in relation with the share-foot, that the former may be reversed and the plow modified as occasion or the nature of the work may require. The invention also consists in a novel and improved clevis whereby the line of draft may be varied relatively with the plow as may be desired.]

RE-ISSUES.

J. L. Booth, of Rochester, N. Y., formerly of Cuyahoga Falls, Ohio, for an Improvement in Grain Separators. Patented Sept. 20, 1859:

I claim, first, The combination of the zig-zag screens and boxes, B C, having a shake motion given them so as to have the grain pass consecutively over and through them, and arranged relatively with each other to operate substantially as and for the purpose set forth.

Second, The inclined zig-zag screens and boxes, B C, with or without the troughs, E, in connection with the revolving fan, G, and spout, H, arranged substantially as and for the purpose set forth.

[This invention consists in the employment or use of zig-zag screens and boxes having a proper shake motion communicated to them, and so arranged that the grain may pass consecutively over and through them, and be subjected to a thorough screening operation. The invention also consists in using in connection with the zig-zag screens and boxes aforesaid, a revolving fan and spout so arranged that the grain will be subjected to an efficient blast for the separation of all light impurities therefrom.

Sylvester Ferguson and G. H. Ferguson, of Malden Bridge, N. Y., for Machine for Feeding Paper to Printing Presses. Patented July, 26, 1859:

We claim, Feeding single sheets of paper to a printing press, paper ruling or other machine requiring the feed of a single sheet at a time by means of the feed roller, I, and friction stop, J, or the equivalents thereof, when the same are arranged and combined essentially as set forth.

We also claim in combination with the roller, I, and friction stop, J, the feed roller, G, or its equivalent, substantially as described, for the purposes herein set forth.

William Fulton, of Cranberry, N. J., for Improvement in Lamps. Patented August 3, 1858. Re-issued Sept. 13, 1859:

I claim, first, The perforated plate, C, or the gauze wire, C, for the purpose of regulating the elastic force of the air so that it may be presented evenly to the flame or their equivalent.

Second, I claim the perforations, b, in the lower part of cap, D, as shown in Fig. 1, in combination with the perforated or air distributing plate, C, or the gauze wire, C, or their equivalent.

Third, I claim the register formed of the perforations, e, in the bottom, A, as shown in Fig. 5, in combination with the perforated plate or gauze wire, C, and the holes, b, in the lower part of cap, D, as shown in Fig. 1, the whole being arranged substantially as and for the purpose herein described.

William Joslin, of Cleveland, Ohio, formerly of Waterford, N. Y., for an Improvement in Machinery for Manufacturing Cordage. Patented Jan, 19, 1847:

I claim the employment of a condensing tube and laying block, or other equivalents thereof, in combination with the means of giving the fore twist to the strands, and the twist to the laid rope, substantially as described, or the equivalent thereof, for the purpose specified.

I also claim the series of flyers turning in stationary bearings to give the fore turn or twist to the strands, as described, in combination with the flyer for giving the twist to the rope, and provided with cross capstan, and means of giving tension to the rope, substantially as described.

A. S. Southworth, of Boston, Mass., for a Plate Holder for Cameras. Patented April 10, 1855:

I claim, bringing the different portions of a single plate or several smaller plates successively into the field of the lens of the camera, substantially in the manner and for the purpose specified.

B. Sexton, of East Windsor, Conn., for an Improvement in Machinery for Drying Cloth. Patented May, 8, 1860:

I claim combining with the wheels armed with tenter hooks substantially as described, the arrangement of rollers, or equivalents thereof, for presenting and drawing off the cloth, so that it shall form part of the periphery of a hollow vessel, substantially as described, and an apparatus, substantially as described, for introducing a blast of air through the segment of the periphery of the said hollow vessel, between the end wheels and between the place where the wet cloth begins to form the periphery of the said hollow vessel, and where the dry cloth is drawn off, substantially as and for the purpose specified.

N. C. Travis, Nathan Johnson and Richard Emerson, of Alton, Ill., assignees of Nathan C. Travis, aforesaid, for an Improved Regulator Valve for Steam Engines. Patented Oct. 11, 1859:

We claim, first, The arrangement and combination of the valve box, A, and casing, C, as and for the purposes herein shown and described.

Second, The arrangement and combination of the screw socket, k, stem, j, rod, l, arm, p, groove, q, and hand wheel, J, so that by turning the hand wheel, J, the stem, I, may be elevated and depressed irrespectively of the rise and fall of the rod, l, and without rotating the latter, all as herein shown and described.

[This invention was illustrated on page 321, Vol. 1, new Series of SCIENTIFIC AMERICAN.]

DESIGNS.

Thomas Loring, of Blackwoodtown, N. J., for a design for Sad Irons.

James Horton and John Martine (assignors to David Stuart and Richard Peterson), of Philadelphia, Pa., for Design for the Plates of a Stove.

James Horton and John Martine (assignors to David Stuart and Richard Peterson), of Philadelphia, Pa., for Design for the Plates of a Cylinder Stove.

W. W. Stanard (assignor to S. S. Jewett and F. H. Root), of Buffalo, N. Y., for Design for a Cook's Stove.

W. W. Stanard (assignor to S. S. Jewett and F. H. Root), of Buffalo, N. Y., for Design for a Cook's Stove.

NOTE.—The number of patents reported in the above list is eighty-six. Out of this large—considering the season—number, THIRTY-FOUR of the cases were solicited through the Scientific American Patent Agency.

MONEY RECEIVED

At the Scientific American Office on account of Patent Office business, for the week ending Saturday, Sept. 29, 1860:—

C. G., of Pa., $30; W. L., of Conn., $25; J. H. L., of Ky., $25; J. N. N., of Pa., $30; L. S., of Ky., $30; C. D., of Mass., $30; E. L. G., of Conn., $30; D. L., of Ill., $30; W. H. H., of Ala., $25; P. H., of Mo., $25; H. & H., of Ind., $25; W. C. E., of Tenn., $30; J. S. Jr., of Pa., $30; N. J., of N. Y., $30; H. S. H., of N. Y., $30; F & S., of N. Y., $25; J. B. & S., of N. J., $100; Z. F., of Mo., $10; G. & S., of Mass., $30; V. Van V., of N. Y., $25; L. G., of La., $30; A. R., of N. J., $100; H. & K., of Ill., $30; C. W. W. S., of Fla., $30, O. B. L., of N. Y., $25; G. K. W., of R. I., $30; C. W. M., of Mass., $30; S. & L., of Pa., $100; D. B. B., of Pa., $25; W. A. D., of Ill., $35; G. S. R., of Miss., $25; G. W. H., of Pa., $30; C. F. A., of N. H., $30; A. C., of N. H., $30; J. R. J., of Ky., $25; R. T. K., of Pa., $30; H. H., of N. Y., $50; H. Van S., of Conn., $55; McN. K. Co., of N. Y., $30; C. H. B., of Conn., $30; J. P. F., of N. Y., $30; J. H. B., of N. Y., $10; I. M., of Ohio, $25; C. R. O., of N. Y., $30; F. & H., of Va., $20; E. P. W., of N. Y., $25; W. S., of N. Y., $40; J. J. S., of N. Y., $30; J. B. VanD., of N. Y., $30; J. B. C., of Ohio, $70; H. S. M., of R. I., $30; C. G. C., of N. Y., $25; J. O., of Pa., $30; B. C., of Pa., $30; S. & G., of Ill., $10; A. F., of N. Y., $12; R. L. U., of N. Y., $30; W. A. L., of N. Y., $25; H. McD., of N. Y., $30; S. L., of Ohio, $25; W. D. A., of N. Y., $30; F. W. H., of Conn., $110; T. S., of N. J., $25; H. W., of N. J., $25; D. M., of N. Y., $25; G. H., of N. Y., $25; A. T. B., of N. Y., $25.

Specifications, drawings and models belonging to parties with the following initials have been forwarded to the Patent Office during the week ending Saturday, Sept. 29, 1860:—

F. W. H., of Conn. (3 cases); W. H. H., of Ga.; W. L., of Conn; C. L., of Cal.; J. M., of Maine; F. & S., of N. Y.; A. T. B., of N. Y.; T. B. J., of Ill.; N. P. B., of Ill.; J. J. P., of Austria; E. G. C., of N. Y.; W. H. L., of N. Y.; W. D. A., of N. Y.; J. H. L., of Ky.; J. W., of England; H. W., of N. J.; D. M., of N. Y.; S. L., of Ohio; H. H., of Iowa; A. A., of N. Y.; F. & H., of Va.; L. L., of N. Y.; J. B. C., of Ohio; J. J. McC., of N. J.; A. C., of Mass.; T. S., of N. J.; Z. G. A. N. P. O., of France; O. B. L., of N. Y.; G. H., of N. Y.; C. W. F., of N. Y.; J. W., of Ohio; C. A. B., of Ala.; H. S. W., of R. I., J. M., of Ohio; H. McD., of N. Y.

THE RISE AND PROGRESS OF INVENTIONS.

During the period of Fourteen Years which has elapsed since the business of procuring patents for inventors was commenced by MUNN & CO., in connection with the publication of this paper, the number of applications for patents in this country and abroad has yearly increased until the number of patents issued at the United States Patent Office last year (1859) amounted to 4,533; while the number granted in the year 1845—fourteen years ago—numbered 502—only about one-third as many as were granted to our own clients last year; there being patented, through the Scientific American Patent Agency, 1,440 during the year 1859. The increasing activity among inventors has largely augmented the number of agencies for transacting such business.

In this profession, the publishers of this paper have become identified with the universal brotherhood of Inventors and Patentees at home and abroad, at the North and the South; and with the increased activity of these men of genius we have kept space up to this time, when we find ourselves transacting a larger business in this profession than any other firm in the world.

We may safely assert that no concern has the combined talent and facilities that we possess for preparing carefully and correctly applications for patents, and attending to all business pertaining thereto.

FREE EXAMINATION OF INVENTIONS.

Persons having conceived an idea which they think may be patentable are advised to make a sketch or model of their invention, and submit to us, with a full description, for advice. The points of novelty are carefully examined, and a reply written corresponding with the facts, free of charge. Address MUNN & CO., No. 37 Park-row, New York.

PRELIMINARY EXAMINATIONS AT THE PATENT OFFICE.

The advice we render gratuitously upon examining an invention does not extend to a search at the Patent Office, to see if a like invention has been presented there, but is an opinion based upon what knowledge we may acquire of a similar invention from our long experience, and the records in our Home Office. But for a fee of $5, accompanied with a model or drawing and description, we have a special search made at the United States Patent Office, and a report setting forth the prospects of obtaining a patent, &c., made up and mailed to the inventor, with a pamphlet, giving instructions for further proceedings. These preliminary examinations are made through our Branch Office, corner of F and Seventh streets, Washington, by experienced and competent persons. Over 1,500 of these examinations were made last year through this office, and as a measure of prudence and economy, we usually advise inventors to have a preliminary examination made. Address MUNN & CO., No. 37 Park-row, New York.

CAVEATS.

Persons desiring to file a caveat can have the papers prepared on reasonable terms, by sending a sketch and description of the invention. The government fee for a caveat is $20. A pamphlet of advice regarding applications for patents and caveats furnished gratis on application by mail. Address MUNN & CO., No. 37 Park-row, New York.

HOW TO MAKE AN APPLICATION FOR A PATENT.

Every applicant for a patent must furnish a model of his invention, if susceptible of one; or if the invention is a chemical production, he must furnish samples of the ingredients of which his composition is composed for the Patent Office. These should be securely packed, the inventor's name marked on them, and sent, with the government fee, by express. The express charges should be prepaid. Small models, from a distance, can often be sent cheaper by mail. The safest way to remit money is by draft on New York, payable to Munn & Co. Persons who live in remote parts of the country can usually purchase drafts from their merchants on their New York correspondents; but if not convenient to do so, there is but little risk in sending bank bills by mail, having the letter registered by the postmaster. Address MUNN & CO., No. 37 Park-row, New York.

REJECTED APPLICATIONS.

We are prepared to undertake the investigation and prosecution of rejected cases, on reasonable terms. The close proximity of our Washington Agency to the Patent Office affords us rare opportunities for the examination and comparison of references, models, drawings, documents, &c. Our success in the prosecution of rejected cases has been very great. The principal portion of our charge is generally left dependent upon the final result.

All persons having rejected cases which they desire to have prosecuted are invited to correspond with us on the subject, giving a brief history of their case, enclosing the official letters, &c.

FOREIGN PATENTS.

We are very extensively engaged in the preparation and securing of patents in the various European countries. For the transaction of this business we have offices at Nos. 66 Chancery Lane, London; 29 Boulevard St. Martin, Paris; and 26 Rue des Eperonniers, Brussels. We think we can safely say that three-fourths of all the European patents secured to American citizens are procured through our Agency.

Inventors will do well to bear in mind that the English law does not limit the issue of patents to inventors. Any one can take out a patent there.

Circulars of information concerning the proper course to be pursued in obtaining patents in foreign countries through our Agency the requirements of the different Patent Offices, &c., may be had gratis upon application at our principal office, No. 37 Park-row, New York, or either of our branch offices.

CAUTION TO INVENTORS.

Messrs. MUNN & CO. wish it to be distinctly understood that they neither buy nor sell patents. They regard it as inconsistent with a proper management of the interests and claims of inventors, to participate in the least apparent speculation in the rights of patentees. They would also advise patentees to be extremely cautious into whose hands they entrust the power to dispose of their inventions. Nearly fifteen years' observation has convinced us that the selling of patents cannot be conducted by the same parties who solicit them for others, without causing distrust.

BUSINESS CONDUCTED CONFIDENTIALLY.

We would inform inventors that their communications are treated with the utmost confidence, and that the secrets of inventors confided to us are never divulged, without an order from the inventor or his acknowledged representative.

TESTIMONIALS.

The annexed letters, from the last three Commissioners of Patents, we commend to the perusal of all persons interested in obtaining Patents:—

Messrs. MUNN & Co.:—I take pleasure in stating that while I held the office of Commissioner of Patents, MORE THAN ONE-FOURTH OF ALL THE BUSINESS OF THE OFFICE CAME THROUGH YOUR HANDS. I have no doubt that the public confidence thus indicated has been fully deserved as I have always observed, in all your intercourse with the Office, a marked degree of promptness, skill and fidelity to the interests of your employers. Yours, very truly,

CHAS. MASON.

Immediately after the appointment of Mr. Holt to the office of Postmaster-General of the United States, he addressed to us the subjoined very gratifying testimonial:—

Messrs. MUNN & Co.:—It affords me much pleasure to bear testimony to the able and efficient manner in which you have discharged your duties of Solicitors of Patents while I had the honor of holding the office of Commissioner. Your business was very large, and you sustained (and, I doubt not, justly deserved) the reputation of energy, marked ability and uncompromising fidelity in performing your professional engagements. Very respectfully,

Your obedient servant, J. HOLT.

Messrs. MUNN & Co.:—Gentlemen: It gives me much pleasure to say that, during the time of my holding the office of Commissioner of Patents, a very large proportion of the business of inventors before the Patent Office was transacted through your agency, and that I have ever found you faithful and devoted to the interests of your clients, as well as eminently qualified to perform the duties of Patent Attorneys with skill and accuracy. Very respectfully,

Your obedient servant, WM. D. BISHOP.

Notes and Queries

S. B. L., of N. Y.—We know of no instrument which is specially manufactured for testing the strength and purity of cider. A hydrometer would be of some use, but not so reliable as the judgment of an expert, founded on inspection and tasting. Pure milk and pure cider are seldom found in commerce. The purest cider is sometimes called champagne.

O. C. W., of Pa.—The yellow substance in the stones which you send us is mica, one of the three constituents of granite.

O. G., of Minn.—We have worn out several pairs of india-rubber soles on leather boots, and liked them very much. Manufacturers have them put on at 75 cents per pair. Any one may put them on with the cement sold by them, but the operation must be very thoroughly and carefully performed, or they will peal off.

J. C. R., of Ind.—Your question has been thoroughly answered on page 313, Vol. II. (new series), of the SCIENTIFIC AMERICAN. Whether it is competent for State laws to authorize the transfer of an interest in a patent, by levy and sale, has never, as we believe, been settled by judicial decisions. It certainly cannot be done as the laws now stand.

A. L., of Ohio.—Your mode of driving the needle in sewing machines is not patentable, unless some novel effect is obtained by it, as it would be regarded as a mere substitution of one mechanical equivalent for another. We think a very limited claim might be obtained on the feed. The thread controlling apparatus does not differ sufficiently from others that are in use, to be patentable.

E. E. W., of N. H.—You will find pretty good treatises on pyrotechny in any of the large encyclopedias. Professor Cutbush, of West Point, published a large book on the subject about 20 years ago. The only other book we remember is a small treatise by Mr. Mortimer.

G. H. A., of Wis.—The recipe you name is correct, and in skilled hands will produce a good article. We know of no cheap varnish which is durable. The cheapest varnishes are made of white turpentine or resin dissolved in oil of turpentine; dryers should be added.

T. D. S., of Pa.—We put little faith in fly traps and fly poisons. The molasses or sugar which it is necessary to mix with the poison attracts to a house about as many as are killed. We know of no substance which will kill flies and at the same time be safe for a child to eat.

C. H Y., of N. Y.—The most approved process for case-hardening is to inclose the article to be hardened in a case filled with horn or similar substances, and heat it for about 6 or 8 hours, according to the size of the article.

T. M., of Mo.—The only reliable way to determine the variation of the magnetic needle is by actual experiment. On certain lines upon the earth's surface, called "lines of no variation," the needle points towards the north pole. Such a line at the present time passes a little south of Cape Lookout, and through the center of Lake Erie, in a N. N. W. direction. The magnetic poles are about 19° from the poles of the globe, and they change their longitude about 1° in 12 years, vibrating between certain limits. In London, in 1576, the variation was 11° easterly; from 1657 to 1669, it was reduced to nothing, and then slowly advanced to its maximum in a westerly direction, which, in 1812, was 24° 17′ 16″. Since that time it has been slowly decreasing. On the N. E. boundaries of the United States, the variation is full 17° West; in Wisconsin, about 9° East; and in Oregon, about 22°, the needle there pointing nearly N. N. E.

L. H. R., of Ill.—The idea of carrying the smoke and cinders of a locomotive, by a pipe, over to the rear of a train of cars, is an old device. It was illustrated in Vol. II. (old series) of the SCIENTIFIC AMERICAN.

J. M. M., of Mo.—To learn with certainty which are the five highest structures in the world would require more labor than the knowledge is worth.

USEFUL HINT TO OUR READERS.

BOUND VOLUMES.—Persons desiring the first volume of the New Series of the SCIENTIFIC AMERICAN can be supplied at the office of publication, and by all the periodical dealers; price, $1.50; by mail, $2, which includes postage. The volume, in sheets, complete, can be furnished by mail; price $1. Vol. II. is now bound and ready for delivery. The price for this volume is the same as that charged for Vol. I.

SUBSCRIBERS TO THE SCIENTIFIC AMERICAN who fail to get their papers regularly will oblige the publishers by stating their complaints in writing. Those who may have missed certain numbers can have them supplied by addressing a note to the office of publication.

GIVE INTELLIGIBLE DIRECTIONS.—We often receive letters with money inclosed, requesting the paper sent for the amount of the enclosure, but no name of State given, and often with the name of the Post-office also omitted. Persons should be careful to write their names plainly when they address publishers, and to name the Post-office at which they wish to receive their paper, and the State in which the Post-office is located.

PATENT CLAIMS.—Persons desiring the claim of any invention which has been patented within 14 years, can obtain a copy by addressing a note to this office, stating the name of the patentee, and date of patent, when known, and enclosing $1 as fee for copying.

RATES OF ADVERTISING.

THIRTY CENTS per line for each and every insertion, payable in advance. To enable all to understand how to calculate the amount they must send when they wish advertisements published, we will explain that ten words average one line. Engravings will not be admitted into our advertising columns; and, as heretofore, the publishers reserve to themselves the right to reject any advertisement sent for publication.

IMPROVED BREECH-LOADING CANNON.

The gun here represented was invented by Captain Charles F. Brown, one of the most fertile and enterprising inventors of the age. It is protected by two patents, the one for the wheel dated July 10, 1860, and the one covering the several combinations in the gun, on the 13th of September, 1860. Both inventions have also been patented in England and France. Mr. Brown has all of his large patent business done through this office, and among all of our thousands of clients, there is no one that we value more highly than our good-natured jovial friend, Captain Brown.

Fig. 1 is a perspective view of the whole gun, and Fig. 2 is a horizontal section of the breech. The bore, A, is carried right through the gun, and is enlarged at the breech by the counter-bore, B. A hollow breech-pin, D, is made to fit the bore of the gun snugly, but easily, with a flange, *e*, to fit the counter bore. A spiral spring, *c*, presses back the breech-pin which is carried forward at each revolution of the cam, F, a roller, *g*, being interposed to diminish the friction; the plan being to push the breech-pin forward and fire the gun at every revolution of the cam. Forward of the breech-pin an opening, H, is made in the gun for the reception of the cartridges. A ball cartridge being dropped into this opening, the breech-pin moves forward, pushing the cartridge before it and closing up the bore in its rear, when the movable plunger, J, is driven forward, so as to strike some percussion powder in the rear end of the cartridge and discharge the gun. The action of this plunger is automatic. It is pressed forward by the spiral spring, J; but as the breech-pin is carried forward, the pin, *i*, which is rigidly secured to the plunger and passes through slots in the breech-pin and gun, and enters a slot in the lever, K, is arrested by coming to the end of this last-named slot. But as the shaft, L, continues its revolutions, the cam, M, presses the end of the lever, L, inward, carrying out the opposite end of the lever and releasing the pin, *i*, when the plunger is driven forward by the spring, J, discharging the gun.

By placing a crank upon shaft, L, the gun may be fired with great rapidity by simply turning the crank; the cartridges being fed in at the time through the opening, H. In retreat, the cam being placed on the same shaft with the rear wheel, the firing of the gun may be effected by the simple revolutions of the latter, resulting from the onward motion of the carriage.

Further information in relation to this invention may be obtained by addressing Charles F. Brown, at Warren, R. I.

Fig. 1

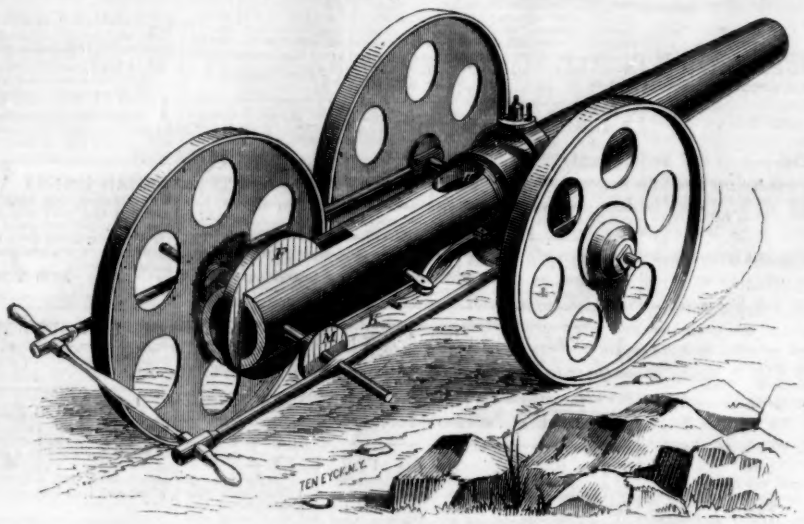
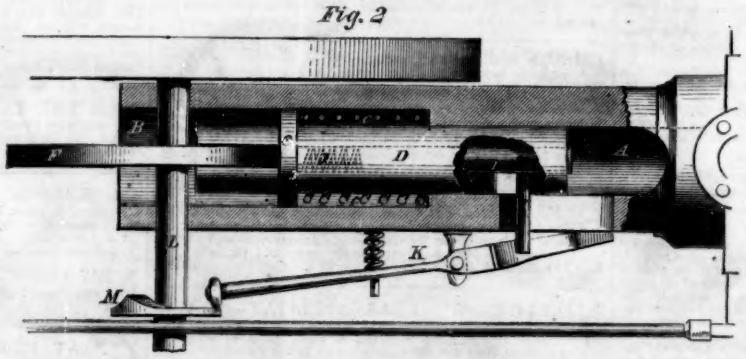


Fig. 2



BROWN'S IMPROVED BREECH-LOADING CANNON.

A NEW TERM.—The SCIENTIFIC AMERICAN, in describing a new balance valve, says the steam chest is full of "live steam.' This we suppose is evaporated from the "waters of life.'—*The Engineer.*

[If the editor of the *Engineer* had come much in contact with the practical engineers of London while he was in that city, he would not have published his ignorance of a term so old and well-known as "live steam." It has long been in general colloquial use to designate the steam which has not done its work in contradistinction to that which has.

A CANNON BALL AND A LOCOMOTIVE.—According to the experiments of Dr. Hutton, the flight of a cannon ball was 6,700 feet in one quarter of a minute, equal to five miles per minute, or 300 miles per hour. It follows, therefore, that a railroad train, going at the rate of 75 miles per hour, has the velocity of one-fourth that of a cannon ball; and the momentum of such a mass, moving at such a speed, is equivalent to the aggregate force of a number of cannon balls equal to one-fourth of its own weight.

WAGES IN ENGLISH MANUFACTORIES.

The manufactories of England are inspected regularly by government officers, who make annual reports. From the report just issued, we extract the following statement of the average wages in the Manchester district, in 1839, when the hours of work were 11½ hours per day, compared with the present 10 hour system. We reduce the shillings given in the report to American currency:—

COTTON SPINNING.

	Weekly wages. 1839.	1859.
Hours of work per week	69	60
Occupations.		
Steam engine tender	$5 81	$7 26
Warehouse boys	1 69	1 94
Warehouse men	4 36	5 33
Carding department—Scutchers (young women and girls)	1 69	1 94
Skippers(young men)	2 66	3 39
Overlookers	6 05	6 77
Card-minders (boys from 14 to 18)	1 45	1 70
Drawing frame tenders (young women)	1 57	1 94
Spinning department—Spinners on self-acting mules	3 87 to 4.36	4 84 to 5 33
Piecers (women and young men)	1 94	2 42
Overlookers	4 84	4 84
Doubling department—Doublers (women)	1 69	2 18
Doffers (girls)	97	1 21
Overlookers	5 81	6 77
Jobbers (young men)	2 42	3 15

CALICO PRINTING, DYEING, BLEACHING.

	Weekly wages. 1839.	1859.
Hours of work per week	60	60
Occupations.		
Color mixers	$8 47	7 74
Machine printers	9 68	9 30
Foremen	9 68	9 68
Block cutters	8 47	6 05
Block printers	9 68	6 77
Dyers	4 36	3 87
Washers and laborers	3 87 a 3 63	3 87 a 3 63

FUSTIAN DYEING.

	Weekly wages. 1839.	1859.
Hours of work per week	61	61
Occupations.		
Dressers	$4 26	5 33
Bleachers	5 08	4 36
Dyers	5 08	3 87
Finishers	5 08	5 33

If some manufacturer among our subscribers will send us a statement of the wages of the same classes of workmen in this country, we shall be pleased to publish it in comparison with the above.

RAILROADS IN GERMANY.

Nothing could be better illustrative of the prominent traits of the German character, caution, solidity and method, than the German railroads and the manner in which they are conducted. Built at great expense, and with great care, they seemed destined to outlast time itself. Taunus Railroad, between Frankfort-on-the-Main and Wiesbaden, cost $260-907 per German mile (the German mile equals 4¾ miles English); the Baden road cost $309,177; the Dusseldorf and Elberfeld, $432,352; the Cologne and Minden, $450,000; and the Rhine road, $569,250 per German mile. As might be expected, the work is done with thoroughness; the bridges are built throughout of stone, and even the smallest viaducts are handsomely arched over; everything is smoothed off; there are no rough, ragged-looking places to offend the eye.

The depots at the stations are universally built of sandstone, and are excellently arranged. With them are connected restaurants where one can procure refreshments similar to that of a first-class hotel.

The caution with which the roads are conducted affords an example which American roads would do well to imitate. A "railroad accident" seldom, if ever, occurs. At distances of about an eighth of a mile, throughout the length of the road, are stationed watchmen, whose duty it is to see that the track is clear, and to prevent people from walking on the premises. It is a punishable offence to walk along the track. Wherever the railroad crosses a highway a gate-keeper is placed, who inexorably closes the barriers the moment he sees the smoke of the advancing train, and will not permit even foot passengers to cross until it is past. The precautions taken to prevent accidents seem excessive to one who is inured to the American system.